AMERICAN
GAS JOURNAL

MARCH, 1938

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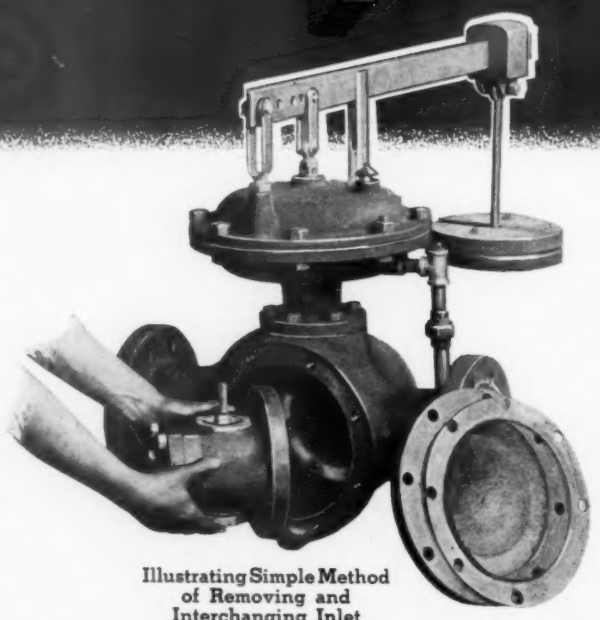

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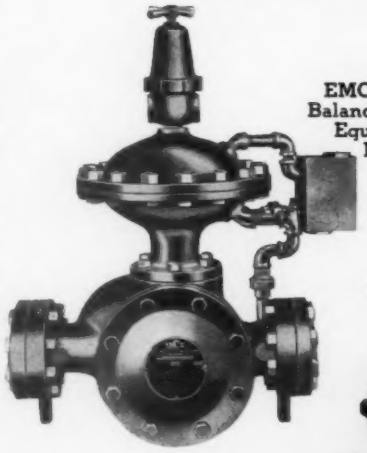

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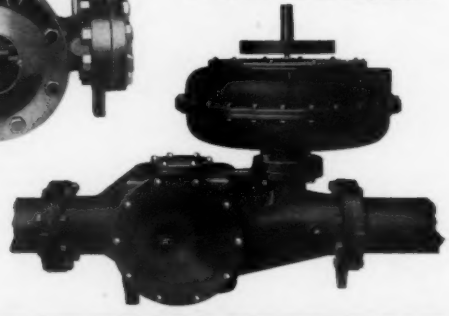

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EMCO *Balanced Valve* REGULATORS

AMERICAN GAS JOURNAL, March, 1938. Vol. 148, No. 3. Published monthly by American Gas Journal, Inc., at 34 North Crystal St., East Stroudsburg, Pa. Executive and Editorial offices at 53 Park Place, New York, N. Y. Entered as second-class matter, October 7, 1928, at the post office at East Stroudsburg, Pa., under the Act of March 3, 1879.

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PROBLEM: To plan a neighborhood for families of diverse occupations and having incomes ranging from $2,000 to $7,000 per year.

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Every competitor must enter Part I. He may, if he elects, enter Part II, in which case he must also enter Part I.

Any competitor may submit as many entries as he wishes in either part of this competition. All entries in Part I—the House Design Competition—must include not only the house plans, but also plans for the kitchen and basement or utility room. The program for this Competition will be sent you upon receipt of the entry coupon on the opposite page.

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2 COMPETITIONS

SPONSORED BY THE AMERICAN GAS ASSOCIATION

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for the building of houses

THIS competition is open to builders and their architects who shall, before *July 1, 1939*, complete the building of one or more houses utilizing "GAS FOR THE 4 BIG JOBS"—cooking, refrigeration, water-heating, and house-heating.

Prizes for the best houses selected in this competition will be awarded to the builders of the houses and to the architects responsible for their design.

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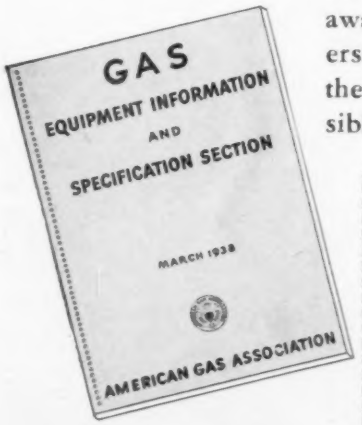

Every contestant must have this free booklet

containing full information and specifications for both the House Design Competition and the House Building Competition.

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AMERICAN GAS ASSOCIATION
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(Please print)
Address_____ City_____

I wish to enter the A.G.A. Architectural Competition ☐
I wish to enter the A.G.A. Builders' Competition ☐

I am an Architect_____ Designer_____ Builder_____
Town Planner_____ Engineer_____ Draftsman_____

Kindly forward complete details on competition checked above.

AGJ

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Signature

PLAN TO USE GAS FOR THE 4 BIG JOBS!

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Radio's Outstanding Dramatic Show
NBC
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EVERY THURS. NIGHT—NBC NETWORK

GOES TO WORK AGAIN FOR SERVEL ELECTROLUX *and for you!*

Beginning April 7th, this great program . . . sponsored by Servel . . . will be selling gas and gas service to your community, will be helping you build more sales in 1938

That Servel salesman's here again.

The March of Time—radio's lively, timely, prestige-building show—will be supporting you once more in 1938. Commencing Thursday, April 7th, 20,000,000 or more listeners from coast to coast will be tuned in every week to the Servel Electrolux story. Among them will be *your* prospects.

These prospects will hear about the different refrigerator. They will learn about the no-moving-parts freezing system. They will be intrigued by the benefits of permanent silence, continued low running cost, and savings that pay for it. They will be told to come in and see you. Above all, they will be impressed by the advantages of gas and gas service.

Servel is once more sponsoring this program, because of its great success in 1937. Reactions last year were splendid. Gas company officials and dealers alike were almost unanimous in their approval of featuring Servel Electrolux on the air by means of this strong, dramatic show.

LIVE REBROADCAST FOR WESTERN STATES

So on April 7th, at 8:00 P.M., Eastern Standard Time, over the basic NBC Network, The March of Time will go to work for you, creating prestige for you throughout your entire community.

And here's good news for Far Western States! This year, there will be a live rebroadcast of this show from the New York studios, so that listeners in the Rocky Mountain and Pacific Coast areas will hear it at 9:15 P.M.—*their time.*

Remember—The March of Time is a part of Servel's greatest advertising campaign, a campaign that is exerting more sales pressure upon your prospects than ever before. Don't miss this opportunity! Tie in with aggressive local poster and newspaper advertising. Utilize the backs of gas bills for gas refrigerator advertisements. Organize your sales staff at once for an intensive drive.

Servel, Inc., Servel Electrolux Sales Division, Evansville, Ind.

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So banish the chance of burner-clogging due to fuel . . . depend exclusively upon Blaw-Knox Gas Cleaners. Operating Engineers from coast to coast are doing that . . . and experience is showing them that "as GAS flows, demand grows".

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GAS CLEANERS

BLAW-KNOX DIVISION of Blaw-Knox Company FARMERS BANK BLDG. PITTSBURGH 22

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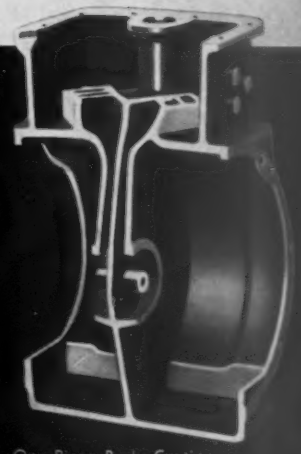

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METRIC METAL WORKS *ERIE, PENNSYLVANIA*

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MARCH
1938

AMERICAN
GAS JOURNAL

VOLUME 148
No. 3

The President's Address

The New England Gas Association Twelfth Annual Business Conference

By
R. L. Fletcher

R. L. FLETCHER

OUTSTANDING among the activities of the Association in 1937 was the Sales Training Program, formulated by a Committee of Association members, with Carl H. Cummings as Chairman, and by Boston University. For an association of our size to knowingly tackle such a task is indeed evidence of clear-thinking members who are willing to give unsparingly of their time and energy.

The program was divided into three parts: a three-day seminar for sales managers, attendance 107; regional meetings for the sales forces of the New England companies at Boston, New Haven, Springfield and Providence, combined attendance 607; and an instructor's guide and a textbook for direct instruction of the sales forces. The seminar and the regional meetings were most successful as indicated by attendance and interest displayed. The instruction work is now under way in most of the companies. To date, reports from various sales managers as to the value of this instruction are very gratifying. The program has been entirely self-supporting. It undoubtedly has laid a firm foundation for continued activities in the education of our sales personnel. I congratulate and thank all who have helped in this undertaking.

Although operating expenses in the New England gas industry showed a constant increase during 1935 and 1936, there was an abrupt upward turn in the cost of doing business in 1937. The cost of raw materials noticeably increased, taxes were raised and pay rolls advanced. In general, these increases have resulted in further lowering the earnings of the various gas utilities. If the immediate future brings additional financial burdens to the industry, earnings will critically suffer, unless such burdens can be offset by added income through sales or through revision in rates.

To those companies still engaged in the production of coal gas, the increases in the cost of coal during 1937 were substantial. These increases resulted from adjustments in wages of the mine workers in April, from Social Security taxes at the mines, from the increase in freight rates from mines to tidewater allowed by the Interstate Commerce Commission on November 15, from increases in steamer freight rate, from the price-fixing by the National Bituminous Coal Commission on December 16 and December 20. The wide differential that formerly existed between the cost of producing coal gas and the cost of producing water gas has been decreasing and, with the foregoing increases which occurred during 1937, this differential in some cases must now be so slight that further advances in cost will result in the shutting down of more of the coal gas producing plants in New England.

The coal gas industry for generations has offered to the coal producer a very desirable class of business. A volume uniform month by month and throughout the years of good business and bad. A business with little credit risk and entailing a minimum of selling expense. In spite of the many reasons why the gas industry should be favored on price, the National Bituminous Coal Commission on December 20, 1937, issued orders placing a premium on the use of coal for by-product, retort and water gas purposes.

Although the railroads of the country collectively may need financial help and although the coal industry also may need help, the solution of their problems does not rest in continuing increases in the cost of coal to the New England gas industry. There is an economic level to which the price of coal may be raised and then the law of diminishing return applies, resulting in a lower return to the railroads and the mines by reason of loss of tonnage. That this is true will be apparent, particularly as the coal gas plants of New England reach the period when it is necessary to re-line their coke ovens or rebuild their retorts. At such a time, it will be a case of the price of bituminous coal versus the price of oil. For the most part, the coal gas producing plants of New England have stand-by equipment for water gas, so that the added investment necessary for the change-over from the production of coal gas to the

Presented at the 12th Annual Business Conference, New England Gas Association, Boston, Feb. 24-25, 1938.

production of water gas will not be substantial.

At the present time, the railroads of the country are petitioning the Interstate Commerce Commission for a further increase in freight rates, which applied to coal will result in another 15 cents per ton advance on coal shipments. Hearings on the proposed freight rate increases were held in Washington in January. Four members of the New England gas industry entered objections before the Commission, explaining in each instance that further increases in the cost of coal might result in a change-over from coal gas production to water gas production. It may seem in general that little was accomplished by individuals appearing before the Interstate Commerce Commission. I am sure however that such appearances are productive and, should a similar occasion arise in the future, that the more New England representatives that appear to offer objections and arguments the better will be the chance for the New England gas industry to obtain relief.

A discussion of the production of coal gas versus the production of water gas naturally brings to mind the matter of the oil reserves of the United States. On December 14, 1937, A. J. Byles, President of the American Petroleum Institute, in an address stated:

"On January 1 of this year the developed reserves of petroleum stood at 13,063,000,000 barrels, or an inventory underground sufficient to supply the current rate of consumption for ten to twelve years.***

"It is estimated that more than a billion acres of geological formation favorable to the accumulation of petroleum remain unprospected in the United States; and reserves at levels below present producing horizons are constantly being disclosed."

Contrasting with this statement was that of W. A. Selvig of the Bureau of Mines in the United States Department of the Interior, made in June, 1936, that the present generation may be forced to supplement oil with liquid fuel from coal. New oil reserves undoubtedly will be discovered but the frequency with which new oil fields are found is declining rapidly.

Each one of us can form his own conclusions as to the future supply of oil for water gas production and the cost thereof.

Taxes continue to be an increasing burden to the gas industry. Federal, local and Social Security taxes collectively take from a gas company a substantial portion of its income. A survey of New England gas companies would probably indicate that taxes represent approximately the entire income of a company for two months of each year. The application of the Social Security taxes has had its effect on the accounting departments of the gas industry, necessitating added investment and personnel.

Compensation paid in the New England gas industry averages favorably with that paid in other industries. Nevertheless, it has been deemed wise or necessary to further raise this level during the past year. Coupled with such increases has been a tendency to be more liberal on vacation allowances. The employes of our industry must realize that these added costs and those resulting from increases in the cost of raw materials and from taxes have not been passed on to the public as in the case of business in general. These increases have consequently resulted in a reduction in earnings.

All of which, naturally, brings up the question: In what manner may the gas industry of New England offset these burdens which accumulated in 1937 and in the years immediately prior to 1937? Should we retract on servicing costs, or charge for service? Should we retract on selling costs? Should we consider lowering the B.t.u. content of sendout gas? Should we consider a general revision in rates or a revision in rates that would more equitably distribute the cost of doing business to those not now fully paying their share? Or can we through increased effort on gas sales overcome our difficulties in spite of increased competition in all directions?

We here in New England have experienced competition with oil for cooking, house heating and water heating, and with electricity for cooking. I think I am correct in saying that the popularity of the oil burner for the kitchen range has diminished and there is a downward trend in the application of oil for this purpose. Nevertheless the number of oil burner installations for house heating still continues upward. Is the saturation point of the installation of oil burners just around the corner? If so, it will be gratifying to the gas industry to know that further inroads on its water heating business through the application of the aquastat to the furnace will cease and that, through replacement of oil burning equipment with gas equipment for house heating, this lost favorable load will gradually be regained. If the saturation point of the oil burner is not near at hand, we can expect to lose more of the water heating load.

The Massachusetts Institute of Technology water heating tests gave us unquestionable evidence of the economy of gas for water heating as compared with oil. It would seem that such data should offset erroneous statements of competitors who sell the customers the idea of obtaining hot water for nothing. I suggest that all of us give more consideration to ways and means of utilizing the Massachusetts Institute of Technology water heating tests.

Losses on cooking to the electric industry have been more than offset by the rapid installation of gas refrigerators. Experts state that the saturation point for mechanical refrigeration has not been reached and consequently we may confidently expect that the popularity of gas refrigeration will continue and that, as the saturation point is reached, the replacement market will offer an excellent field for a continuation of the sale of gas refrigerators.

The industrial sales engineers of New England have been doing very excellent work in the application of gas to more and more industrial processes. This is a favorable sign, in spite of the fact that the consumption of gas is in the lower brackets of our rate structure.

The new building programs sponsored by the Government of the United States offer a very fertile field to the gas industry. There is however a tendency on the part of speculative builders, even in the lower cost houses, to provide the houses with oil burner installations, not even arranging the cellar for the possible use of solid fuel of any kind. It will take considerable energy on the part of the gas man to overcome this tendency of the builder. The necessity of overcoming it should not be overlooked.

I believe that we are fortunate in having the program formulated by the American Gas Association known as the Home Appliance Bureau, headed by J. F. Quinlan. Further activities of the American Gas Association that are helpful to us in New England are the national advertising, the excellent work of the Laboratory, particularly on the appliance research problem, and the planned gas exhibit in the New York World's Fair in 1939.

As President of the Association, it is my intention to emphasize certain conditions affecting our New Eng-

(Concluded on page 46)

Industrial Gas Burner Systems

By

Raymond F. Mann

Wentz-Mann Company
Kenmore, N. Y.

IN an article entitled "The Choice of a Burner System," in the February issue of the JOURNAL, there was a discussion in some detail of the relative advantages and disadvantages, and hence a choice, between three burner systems, all of the automatically proportioning type. Those three systems by no means embraced the entire field from which the industrial engineer draws when confronted with a problem. Therefore it seems desirable at this time to include as far as practical a discussion of all the more common burner systems. Two angles will concern us, the method by which the mixture of gas and air is achieved, and the burner proper where combustion takes place after the mixing has been accomplished.

The most cursory examination of the entire subject of industrial gas shows the importance of the so-called "atmospheric" type of burner. Just as this type predominates in the domestic field, it leads in the commercial and industrial establishments. The tailor shop with its little 2 or 3 horsepower boiler, the neighborhood bakery with its cabinet bake oven, the confectionery store with its little candy furnace, the garage with its tire vulcanizing or retreading plant, the little machine shop with its soldering furnace, the meat market that boils it hams or smokes its own meats, all these depend on the atmospheric burner, the invention of Robert Bunsen in 1852.

The principle of the Bunsen burner is well known. The kinetic energy of the gas at ordinary line pressure, escaping through a small orifice, is used to draw in from the atmosphere a part of the air necessary for combustion. Mixing of this so-called "primary air" and gas follows, the mixture is conveyed to the burner head or "port" where combustion takes place with the addition of the remainder of the necessary air, the so-called "secondary air," drawn from the atmosphere surrounding the burner head. Knowledge of the design and application of this type of gas burner is one of the most necessary tools in the kit of the industrial gas engineer. Fortunately, the field has been well surveyed, considerable research has been done, and the available literature quite adequate. Three references should suffice:—Bureau of Standards Circular No. 394, "Design of Gas Burners for Domestic Use;" "Combustion," A. G. A.; and the "Gas Engineers Handbook," McGraw Hill Publishing Co. There is a wealth of material in any one of these three references that should be at the finger tips of every engineer in this field.

It is not our intention to repeat the conclusions reached nor to examine the theory on which they are based. Rather we shall attempt to show their actual application by taking up an actual problem in design such as the industrial engineer frequently encounters. Before turning to any calculations or using any specific figures, however, it would be well to emphasize one point. As the various authorities on atmospheric burner design are careful to point out, the entire matter of such design consists of a series of compromises. So many factors are concerned that their influences are often conflicting. Take for example so relatively simple a matter as the design of a drilled pipe burner. We must consider port area, size, and spacing; burner head area and shape; throat area and shape; and the position, size, and form of orifice. In the resulting burner we desire high efficiency of combustion, good flame stability, a high turndown, flexibility as regards changes in gas pressures or characteristics, and a low initial cost of manufacture. Frequently, however, changing a certain factor to make an improvement from one angle results in a distinct loss from another angle. Thus, changes which tend to increase the amount of primary air that will be induced lead to a higher efficiency of combustion but at the same time give a flame of less stability as regards blowing away or flashing back into the mixer. Hence it is obvious that once again the industrial engineer has to justify his title by bringing a certain amount of judgment and experience to bear on the specific problem in hand at the time.

In our own experience we have found a radical departure from one of the so-called "ideal conditions" necessary in order to keep the initial cost and size of the burner down to practical limits. We sacrifice flexibility and turndown but these factors are considerably less important to us than the two just mentioned in most cases. The rule in question is the ratio of burner port area to burner head area. Authorities advise a ratio of 1 to 3 or at least 1 to 2. We use a ratio of 2 to 1 and for our purposes and conditions it works out very satisfactorily (an actual case is given further on).

Atmospheric burners come in many shapes and sizes. Every manufacturer's catalogue lists a wide variety and generally it is possible to fill ones needs from the manufacturer's stock. Especially is this the case with round burners. It is only necessary to figure the gas demand and then pick from the catalogue the correct ring burner, one of the proper diameter and capacity. There is little scope here or need for a knowledge of burner design. That, however, is not the only type of problem. More often it is required to heat a rectangular shaped tank or oven, and the obvious solution is drilled pipe burners. Of course, even in this case, it may be possible to find in a manufacturer's catalogue drilled pipe burners that will fit, but perhaps not. Perhaps it is a question of time and the consumer can not wait for factory delivery. Perhaps it is a question of dollars and cents. The consumer cannot justify an actual outlay of money; but he can be persuaded to take a few pieces of pipe lying around his plant, drill some ports as directed, and pay a nominal sum for a few atmospheric mixers. In these cases it is up to the industrial engineer to furnish the necessary design. Let us, therefore, go through a typical case.

Mr. A walks into your office. He boils hams and has a tank 5 feet long by 3 feet wide by 30 inches deep. The tank is in place and the burners

must be ready that week-end. He wants them designed as he waits, and he doesn't look too patient. All right. It is too late for the application of the immersion burners that you would logically recommend, so you go ahead on drilled pipe burners. 5′ x 3′ x 2′ equals 30 cubic feet of water or 1,872 pounds that must be raised from room temperature to a boil. 1,872 × (212-60) equals 285,000 B.t.u. This is the demand at 100% efficiency. You are working fast and have no time for figuring radiation losses from tank surface and sides, nor for a consideration of available heats or stack losses. Instead you just assume an overall efficiency of 50%. Then the demand becomes 570,000 B.t.u. How long can be allowed to bring the water to a boil? The consumer is anxious for as short a time as possible. You point out how little gas will be needed after temperature is reached and how unwieldy too large burners can be. You compromise on 1½ hours. Hence the hourly demand becomes 2/3 × 570,000 or 380,000 B.t.u.

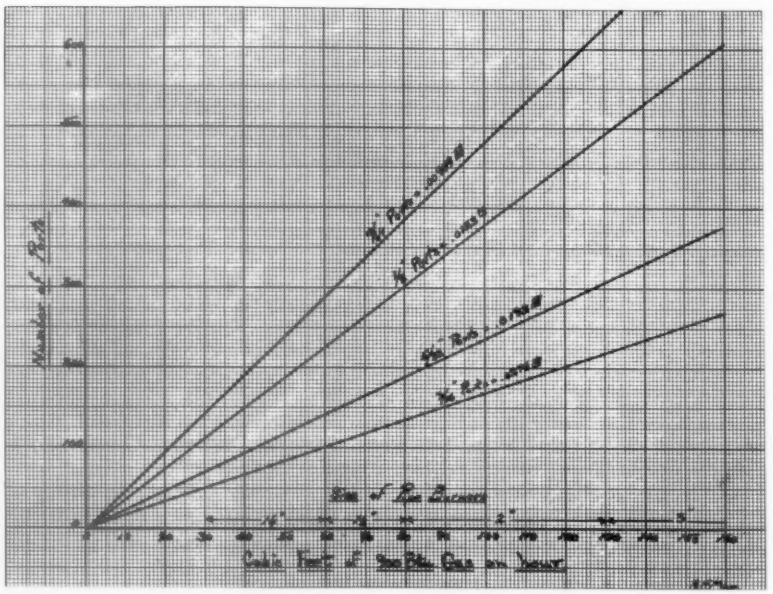

Figure 1

This is still rather a sizable amount of gas and you decide to divide it into four burners, spacing them on 6 inch centers and running the length of the tank. This will give good distribution of the heat over the bottom of the tank and also permit a wide turn down, as three of the burners can be turned completely off if desired. Then each burner must handle 95,000 B.t.u. an hour. Our 900 B.t.u. mixed gas gives excellent results on the basis of 20,000 B.t.u. per square inch of port area. Therefore you need 4.75 square inches of port area each. If you decide on 5/32″ ports (area .0192) you will require 247 per burner. With a flame length of 5 feet (the length of the tank), there must be four ports per inch. Therefore, the burner becomes this:—Two rows of 5/32″ ports on 1/2″ centers horizontally, with the two rows 1/2″ apart and the ports staggered in respect to each other. Using our ratio of 2:1 for port area to burner head area, you choose 2″ black pipe, allow 2″ x 6″ or 12 inches before the first port, and feed it from that end with a 2″ mixer, preferably of the venturi type. Mr. A has his burner design and not many seconds have ticked off on his watch.

In order to save a few more seconds and to serve as a check on detailed calculations, the accompanying chart is offered (see Figure 1). It is based on the same rules used above, and on 900 B.t.u. mixed gas has proven thoroughly satisfactory.

Its use for other gases is subject to certain modifications as study of the three references given above will indicate. In general, with 550 B.t.u. straight manufactured gas, trouble with backfire will be avoided if ports not larger than ⅛″ are employed. It is also possible to obtain more than 20,000 B.t.u. per square inch of port area if necessary. The chart can, however, be used as given, merely omitting the 5/32″ and 3/16″ lines and changing the cubic feet of gas by the ratio of 900/550. For straight natural gas, the larger ports are suitable but a greater port area is desirable and the diagonal lines should ascend at a greater angle from the horizontal, local conditions determining the exact angle.

It should not be assumed that this chart gives the limits of practical burners. Far from it. In our own experience we have designed and installed burners of 4″ pipe with flame lengths of 29 and 30 feet. A short description of two such installations might be instructive as they illustrate a point sometimes overlooked, i.e. the supply of secondary air.

These particular burners were installed in large mould ovens in two different plants, two in one oven and four in the other. In both cases two rows of 3/16″ ports were drilled on 3/4″ centers horizontally, with the rows themselves spaced 3/4″ apart, the ports staggered. Standard 4″ black pipe was used. A flame length of 29 feet in one case and 30 in the other gave 928 and 960 ports respectively, or total port areas of 25.6 and 26.5 square inches as against an internal cross area for 4″ pipe of 12.7 square inches. These burners operated only at full capacity, and in a number of years have given no trouble whatever (the usual statement for atmospheric burners as they require no servicing except for an occasional cleaning). The spacing of ports (3/4″) is rather wide, and in lighting it is first necessary to spin the air shutters closed on the 4″ venturi mixers (No. 58A Surface Combustion Corp.) so as to shut off the primary air. After the flame has run the full length of the burner, the shutters are opened, and they burn steadily for the period of the bake.

In the original installation, one factor had to be given special consideration and should be emphasized here. With burners of this length, consuming some 550 cubic feet of 900 B.t.u. gas an hour each, it was necessary to give thought to the supply of secondary air. In one oven the burners rested on a series of concrete blocks in channels running the full length of the oven and open to the atmosphere at both ends. In the other the burners lay on the oven floor and called for different treatment. We therefore resorted to the use of ordinary 6″ black stove pipe, placing it parallel to, at one side, and a little below the burner and punching it with a row of 1″ holes placed 8″ on centers. Both ends of the 6″ pipe were allowed to stick out of the oven. This solved the problem and the flame burned evenly its entire length.

Before leaving the atmospheric

burner for the pressure type of burner their relative merits may properly be discussed. Taking the atmospheric first:—

Advantages:

Operate on ordinary line pressures.
Require no auxiliary source of air.
Inexpensive to build.
Simple.
Flexible.
Easy to apply automatic control.
Easy to apply safety devices.
Easy to understand.
Require little or no service.

Disadvantages:

Limited temperature. Rarely used for temperatures over 900 F. (The Hones high temperature oven furnaces and melting furnaces are most noteworthy exceptions.)

Complete combustion is obtained only by an excess of secondary air, hence always accompanied by an oxidizing atmosphere.

Relatively large combustion space needed.

Low manifold pressure, meaning bulky manifolds, large port area, etc.

Positive method of removing products of combustion essential.

Lower efficiencies.

Pressure Type Burners

The first step in the evolution of the modern pressure type of burner was undoubtedly the so-called "mixing-tee" or "two-valve control" burner. In a burner system of this nature air under pressure (any pressure from fan to compressor) enters one end of an ordinary tee, the gas enters at right angles from the side of the tee, and the mixture leaves from the other end where it is conducted to the burner proper. If an ordinary tee is used as described above, the air pressure is exerted to some extent against the gas pressure and may seriously reduce the capacity of the burner. For this reason it is usual to put a running thread on the nipple conducting the air to the tee, and carry this nipple through the tee and past the center of the gas supply (see Figure 2). In this way the kinetic energy of the air is used to inspirate the gas. It must be noted, however, that unless the jet is especially designed and the gas has been reduced to atmospheric pressure, the amount of gas so inspirated is not directly proportional to the amount of air over a range of capacity. On the contrary it is necessary to adjust both gas and air valves with any change in demand, hence the name "two-valve control." (The No. 60 series North American venturi Mixers are excellent examples of this type).

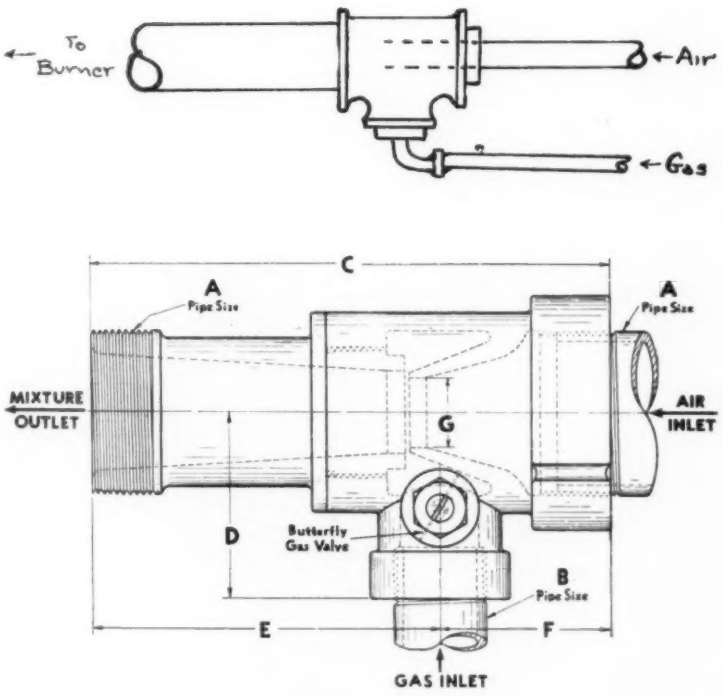

Figure 2

Mixing Tee Burners

Advantages:

Simple to build from stock pipe fittings.
Low first cost.
Rapid adjustment of flame and atmosphere.
High manifold pressure.

Disadvantages:

Efficiency depends entirely on skill of operator.
Not automatically proportioning.
Difficult to apply automatic control.
Nature of flame changes with any change in gas or air pressure.
Clogging of burner with an air pressure above the gas pressure may back air into gas lines.

Automatic Proportioning Burner Systems

The final step in the evolution of modern industrial gas burner equipment was the design of the automatically proportioning types. The word "types" is used advisedly as many kinds are available, all functioning efficiently and satisfactory from all standpoints. The drawing of comparisons is a difficult one and with some misgivings we present the author's own thoughts on this subject, admittedly personal views.

Five manufacturers dominate this field, overlapping to some extent, and with apologies in advance, we are dividing the field into three more or less distinctive types as follows:—

A. Central Mixing, Complete or Partial.

Manufacturers:—Kemp Mfg. Co., Selas Co.

Distinguishing Characteristics:—Air and gas mixed at one central point and conveyed from here at a comparatively high manifold pressure to individual burners in individual furnaces. A one pipe system controlled by one valve at each burner.

Advantages:—A one pipe system. Ideal for canning factories or glass working plants where a large number of individual burners operating at high temperatures are found.

Mixing done at one point. Easy to regulate entire factory.

High manifold pressure. Ideal for immersion burners.

Disadvantages:—Rather high first cost unless a large plant involved, then apt to be the lowest.

With complete premix an explosive mixture has to be carried through the plant and safety precautions are necessary.

Can not have different flames or atmospheres at different furnaces.

B. Blower-Mixers

Manufacturer:—Maxon Premix Burner Co.

Distinguishing Characteristics:—A low pressure blower draws gas and air into its casing, mixes them, and discharges the completed mixture through a manifold of limited

length to the individual burner or burners.

Advantages:—Eliminates need for a separate supply of air under pressure.

Portable and flexible.

Disadvantages:—Low manifold pressure (2.5-6.5").

Precautions needed against flashback.

Initial cost.

C. Local Mixing

Manufacturers:—Eclipse Fuel Engineering Co., Surface Combustion Corp.

Distinguishing Characteristics:—Mixing done at the furnace. Limited number of burners on each proportioning device. (See February article for cuts and more detailed description.)

Advantages:—Reasonably low first cost.

Add on units as needed.

Wide range of sizes.

Ability to vary atmosphere of furnace.

Can take advantage of existing plant air.

Extremely flexible.

Disadvantages:—Low manifold pressure.

Multiplicity of mixers in a large furnace.

Miscellaneous Burner Systems

While the more common types of burner systems have been covered in the foregoing in a more or less cursory way, there still remain such types as nozzle mixing (a modification of the two-valve control type) and the diffusion or so-called "luminous flame" burner. The latter is an important recent development based on the principle of allowing the air for combustion and the gas at equal pressures to emerge from the burner head in parallel streams. Thus combustion takes place over a considerable area, with a resulting flame high in luminosity and radiant heat. It is used for open hearth furnaces, glass furnaces, radiant tube furnaces and many other more or less special applications where as a rule the local industrial engineer will be assisted by the factory engineer.

Burners Proper

Assuming that we have mixed the gas with the proper proportion of air by one of the various methods described above, the next problem confronting us is the choice of the burner proper. Immediately we encounter a greater variety than in the mixing systems themselves. In an attempt at simplification we are arbitrarily dividing the field into three main groups, conscious of the fact that such a division is far from all-inclusive.

A. Tunnel Burners

Manufacturers:—Eclipse Fuel Engineering Co., Surface Combustion Corp.

Distinguishing Characteristics:—A gas-air mixture is discharged from the nozzle at a velocity far above its flame propagation rate and is held on the burner by means of a cylindrical or conical shaped tunnel set in the furnace wall.

Advantages:—Burners can be sealed into the furnace wall and any desired atmosphere maintained.

Extremely large capacity per cubic foot of combustion space.

Disadvantages:—Tunnel has to be accurately proportioned to the particular burner nozzle.

Maintenance of tunnels.

Limited turndown.

Piloting difficulties.

B. Open Blast or Torch Type

Manufacturers:—Maxon Premix-Sticktite, Eclipse Fuel-Ferrofix, S. C. Corp.-Cast Iron Tip Burners.

Distinguishing Characteristics:—A large open port surrounded by a ring in which part of the air-gas mixture burns, acting as a pilot in holding the main body of flame on the burner.

Advantages:—Requires no tunnels or baffles.

Won't blow away.

Good turndown.

Easy to light.

Disadvantages:—Burner must be kept cool by air being drawn over it. Hence furnace will always have an oxidizing atmosphere.

Efficiency lower for same reason.

Can't be sealed into wall.

C. Blast Tips

Manufacturers:—American Lava Corporation, Eclipse Fuel Engineering Co., Selas Co., American Gas Furnace Co.

Distinguishing Characteristics:—Small burners, self-piloting designed for multiple installations.

Advantages:—Can be arranged in any combination to confirm to any shape desired.

Brings the advantages of premix systems to drilled pipe burners.

Disadvantages:—Not generally built for high temperature work.

Occasional lighting difficulties when in series unless special lighting burners used.

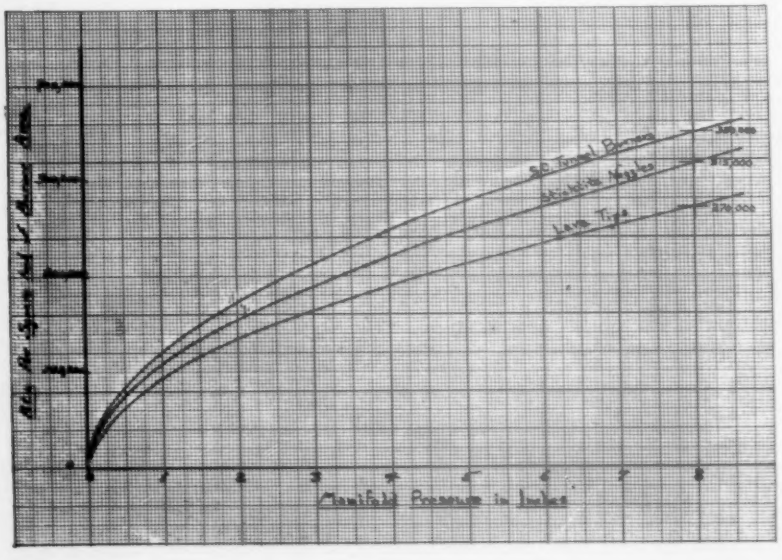

Figure 3

In Figure 3 is given the B.t.u. capacity per square inch of port area for three typical representatives of the types just described. It corresponds to Figure 1 for atmospheric burners, and should aid in the choice of the correct size, as well as illustrating how they differ in capacity.

Perhaps enough has been given in the foregoing to bring out this important point:—No one burner system or any one burner head can take care of all the problems that the industrial gas engineer must face. Like a good golfer he must know a great variety of shots and be able at the crucial moment to pull from his bag the proper club for the job in hand.

Pipe Corrosion & Coatings

Types of Coatings

By Erick Larson

Part 21

PAINTS

THERE are numerous designations for coatings depending on such characteristics as the origin of the basic material, state in which the coating exists at ordinary atmospheric temperatures, method of application, comparative value for resisting corrosion, design, etc. The simplest designations are the popular terms by which groups of corrosion resisting or decorative materials are known.

Paints include all types of coatings applied to surfaces exposed to deterioration in the atmosphere. Many paints having lead oxides, graphite or other pigments have successfully resisted atmospheric deterioration of the materials coated when exposed to the specific conditions for which they were designed. Experience has proved that ordinary paints have no protective value against sub-surface corrosion. A major factor in their failure is the ease with which the common vehicles saponify under sub-surface moisture conditions. There has been practically no difference in experience with animal or vegetable oils. Unprotected metals have as long an existence in soils as those coated with ordinary paint.

Paints have been mentioned as unsatisfactory for resistance to sub-surface corrosion. Paints have been developed which resist accelerated and field tests for atmospheric corrosion in such an excellent manner that a normal reaction is to conclude they have merit for the protection of sub-surface structures. The citation of examples of failures will indicate the extreme difficulties encountered beneath the surface. However, it is hoped that the normal reaction mentioned will continue to exist and judicial trials be given to any material which may have merit.

Iron-oxide, Silica Paint

In 1932 inspiration was received from a trait of our American Indians to paint themselves. One of the basic materials used by the Indians was investigated and two basic pigments were developed. The analysis of the pigments made by an independent assayist was as follows.

"In the sample as received:

Iron	46. 9%
Equivalent to	
Iron Oxide (Fe_2O_3)	67.06%
Silica	18.60%
Alumina	8.00%
Manganese	0.01%
Calcium Oxide (CaO)	0.76%
Magnesium Oxide (MgO)	0.45%
Sulphur	0.01%
Ignition Loss	3.40%"

"In the sample as received:

Iron	19. 7%
Equivalent to	
Iron Oxide (Fe_2O_3)	28.17%
Silica	63.05%
Alumina	5.20%
Manganese	0.02%
Calcium Oxide (CaO)	0.71%
Manganesium Oxide (MgO)	0.38%
Sulphur	0.01%
Ignition Loss	1.54%"

This latter material was recommended by the manufacturers for use in soils.

The ore was ground directly with no calcining or heating. The ore was mostly in the form of oxides. The silicate was amorphous having a hardness of 5½ to 6. The reaction of the basic material after boiling was neutral. The powder base passed a 300 mesh sieve. Wood, tung and vegetable oils were used as a vehicle. Application can be by brushing, dipping or spraying. The paint may be thinned with the usual paint thinners. The vehicles would act as ordinary paint vehicles when drying. The pipe surface was thoroughly cleaned and dried.

One test showed a resistance of 1600 volts per mill of thickness. Apparently the iron oxide base has a greater resistance than ordinary red lead. Drying required 6 to 8 hours although the paint remained tacky to the touch for several days. The same material was used for a base and finish coat. The graveyard test was made on pipe having only one coat.

An accelerated test of the abrasion resistance of this paint consisted of blowing carborundum dust through a pipe coated internally. While ordinary red lead base paints were penetrated after the passage of 4 to 5 pounds, the Indian paint withstood 95 pounds. Bond was tested by scraping with a knife. The paint could not be peeled off the pipe indicating a good bond at least with a newly cured coating.

After long exposure to direct sunlight and atmospheric conditions the paint remained in excellent condition. The surface remained shiny even where directly exposed to the sun long after red lead base comparison samples had become dulled.

Pipes coated with the material were buried in salt water marshland. The first samples were exposed in 1½ months. Bare steel had pit depths varying from 0.003 to 0.007 inches. The paint had lost its gloss and in places was noticeably thinner. Most of the painted surface had turned black but a few small areas were dark green. Minute blisters were scattered over the whole surface. Microscopic examinations showed minute pits under the green areas and surface corrosion beneath the black areas. At the end of 3½ months the pits in the bare steel and coated pipe both ranged up to 0.019". A paint which clearly identified Indian trails for forty years had failed to deter sub-surface corrosion at all.

Copper Paints

A so-called "liquid copper" paint survived severe accelerated tests. The pigment in the primer was a refined elemental silicon. The finishing coat had a phenolic vehicle and each gallon was pigmented with 4 pounds of 98.3% pure metallic copper ground to pass a sieve of 400 mesh fineness. In the burial test ground mentioned above this material unshielded provided no practical protection.

Lacquers and varnishes are not strictly paints but may be placed in the same category as pipe coatings.

Lacquers

Lacquers are placed in the same category as paints when considering their value as protection against soil corrosion. A common practice is the application of china wood oil or other similar material at pipe mills for protection against corrosion until the specified protection is applied. Such coatings are not only valueless as a protection against soil corrosion but may interfere with the success of real protection. Lacquers prevent proper bonding between coatings and pipe and should be removed before application of primers or coatings. Lacquers will protect pipe from atmospheric corrosion but only for a short period. The sun's rays are particularly destructive to lacquers. Lacquered pipe in exposed stock piles or strung along a proposed installation site frequently corrodes rapidly on the section directly exposed to the sun while the lacquer on the unexposed area will protect the pipe for a comparatively long period. Lacquers may be removed easily by washing with a caustic or acid solution, wire brushing, sand blasting or heating. All traces of solutions should be thoroughly removed by washing and the pipe thoroughly dried before applying the protection.

Lacquers are satisfactory for the original intention of pipe mills which was to apply a cheap temporary corrosion protectant which would not interfere with handling; storage; joining by welding, threading or coupling

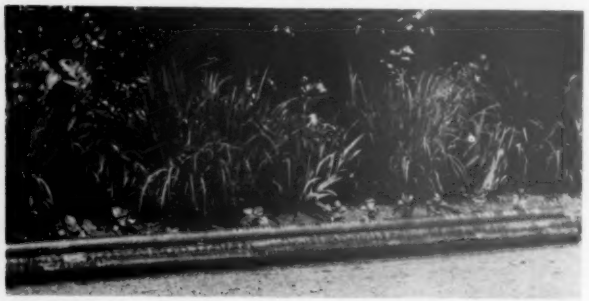

Fig. 1. Note streaked condition of two nearest pipes which is surface which had been exposed to direct sunlight in the stock piles. The rear pipe has the non-exposed surface showing. The pipe had been coated with china wood oil at the mill two months previous to photograph at installation site. Streaked condition is from surface corrosion.

or any other operation. Lacquer has been found partially intact after a period of burial but the pipe would also have retained its original appearance under such conditions if installed without the lacquer.

Special Corrosion Resistors

Manufacturers of corrosion protectants have attempted to avoid terms which may indicate a similarity between their products and ordinary paints. This category includes a vast variety of trade designated paints whose basic ingredients are tar or asphalt or a combination of the two. Some of these paints are asphalt emulsions while others use oils and various solvents for the vehicle. Tar mastics are also included in this designation. These resistors are most commonly applied by brushing on as they are in a liquid state when received and at ordinary atmospheric temperatures. Those in a plastic state are applied with a putty knife, trowel or even with a gloved hand. Included in this group are the primers used as bonding material for other coatings.

A frequent contended advantage cited by manufacturers is the continued plasticity or non-drying characteristics of their products. This characteristic is not always an advantage as the fluidity of such coatings provides no resistance to the physical forces which are destructive to protectants. Soil absorption and root penetration of such coatings occur rapidly. These coatings are classed with other paints in so far as a sub-surface corrosion protectant is concerned. In non-corrosive soils the special corrosion protectant may last for long periods but in such instances the life of uncoated pipe does not economically justify the use of protection.

The type of paint failure from sub-surface corrosion is similar in some instances to failure from various atmospheric conditions. The soil or liquids in the soil may absorb or dissolve the coating. Absorption or solution of part of the paint ingredients results in a spongy mass permitting direct access of corrosion agents to the pipe.

The placing of experimental coatings in the paint category as sub-surface corrosion protectants should be avoided until tests have been conducted. Paints having vehicles depending upon slow oxidation or evaporation for drying are excluded from use as coatings. The non-drying variety may have an excess of vehicle and a lack of the material which primarily produces protection. This condition does not exist in the petrolatums or the more commonly termed greases. A lack of resistance to the physical forces encountered in laying mains causes frequent holidays in paint coats. The thinness of the comparatively soft coating results in exposing the pipe metal by the least abrasion. The shielding of paint coats is uneconomical as such coatings offer no assistance to the wrapper to resist physical forces resulting in distortion or displacement of the coating. The wrapper will not resist the chemical and electrical destructive forces when there is no coating between it and the pipe.

Paint coats are affected by atmospheric conditions during application. Mist, fog, dampness together with mildewed or moist pipe prevent a good bond between pipe and coating. Moisture on the pipe results in a certain amount of emulsification of the paint thus destroying its value.

These disadvantages of paint coats are outlined due to the continued use of such types of coatings even in the light of experience.

PRIMERS

Primers and coatings may be treated together when discussing the types of coatings as primers in practically all instances are solutions of the coatings with fillers omitted. The petrolatums as a class do not require primers although sometimes one is applied previous to a mill application of the coating.

The bituminous coating materials require primers for all practical methods of application. These primers are practically "cut backs" or solutions of coal tars or asphalts. Originally such cut backs were used as a coating but because of many disadvantages their use for such a purpose is inadvisable.

The cut backs originally used as paint coats have been improved to meet the primary requirement of providing a strong bond for the coating. Too much emphasis can

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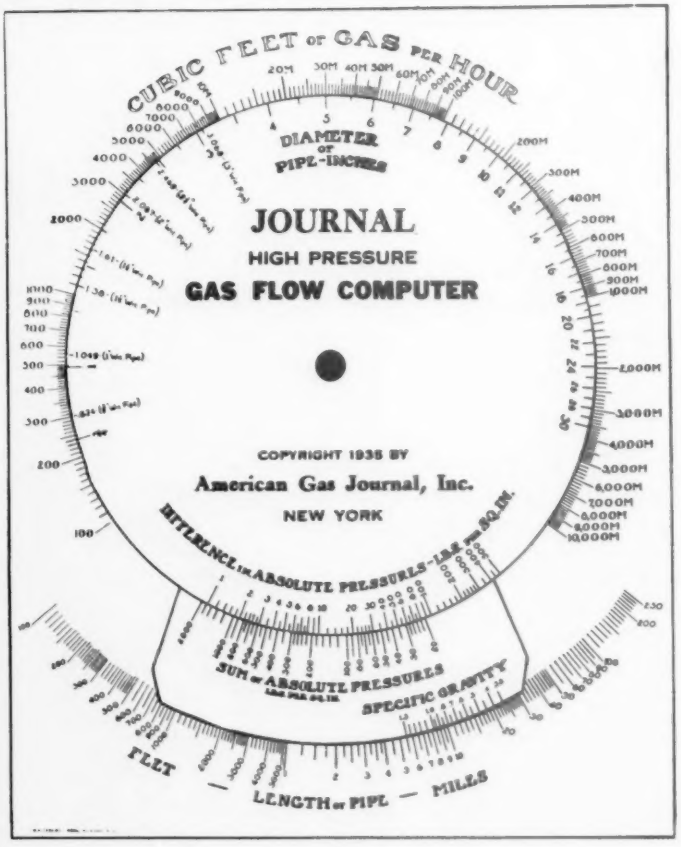
"Journal" Gas Flow Computers



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Sum of Absolute Pressures—Lbs. per sq. in 2000-20
Specific Gravity 1.5-.35
Length of Pipe—Feet 100-5000
Length of Pipe—Miles 1-250

Low Pressure Computer Range:

Cu. Ft. of Gas Per Hour—10 to 500 M
Pipe Diameter ¾" to 48" (including standard and actual weight up to 4")
Pressure Loss Inches .01-10.
Length of Pipe—Feet 30-30,000
Specific Gravity 1.5-.35
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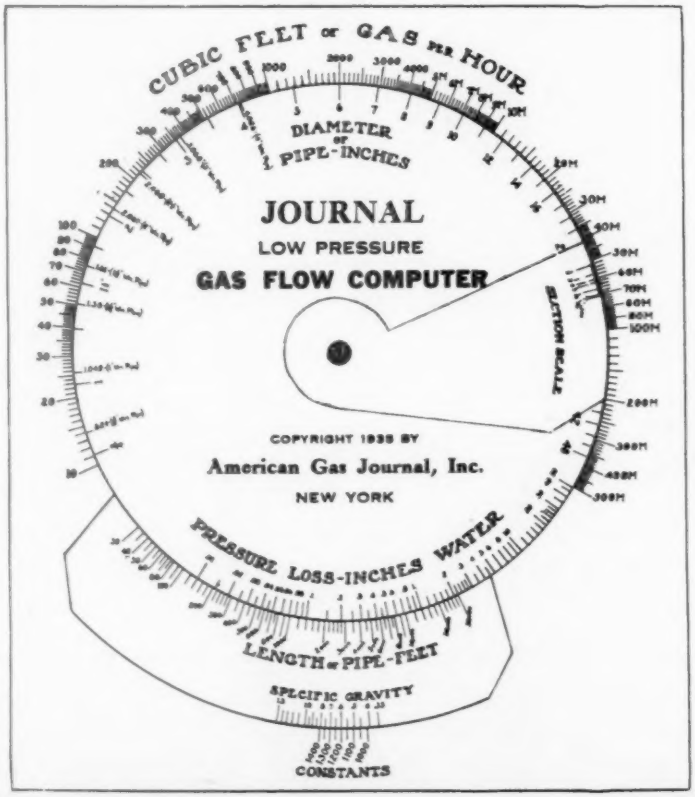

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not be placed upon the primary purpose as many have considered the primer as a protection against atmospheric corrosion. As a paint a primer is ordinarily of less value than the common paints.

The importance of bond warrants the repetition that a tar base primer should be used with a tar base enamel and similarly an asphalt primer with an asphalt coating.

A cement coating if considered adequate does not require a primer but it is considered preferable to view cement or concrete as a shield.

VITREOUS ENAMELS

Definition

A vitreous enamel is a substance akin to glass which is fused onto metal at a red heat. The general composition of vitreous enamel is a boro-silicate of sodium potassium, calcium and aluminum. Practical production makes use of a mixture of grit, clay, borax, feldspar and water. Vitreous enamel when applied has the appearance and general composition of the glazed surfaces of tile or earthenware pipe. The pipe is first pickled after which the vitreous enamel ingredients are sprayed on or the pipe dipped. The baking producing fusion is at temperatures from 1500 to 1620 degrees F. depending upon the particular use to which the finished product will be subjected.

History

The covering of metals with a vitreous coating is an ancient art. Originally used in the decorative arts its practical use as a corrosion protectant was enhanced by developments in application conceived about 80 years ago. Improvements in application originated during the past ten years have still further advanced the practicality of vitreous enamels for all types of corrosion resistance. Vitreous enamels for pipe coating were used in Germany before introduction to the United States.

Uniformity of Quality

The extensive application of vitreous enamel to laundry and bathroom fixtures and apparatus, vats, kitchen utensils, etc. has required volume production. Research has therefore been warranted and an exact control of automatic manufacturing has resulted. The uniformity of the product has been established and now depends upon the care exercised by the manufacturer.

Bond

The bond of a vitreous enamel to metals to which it has been fused exceeds that of any coatings flowed or painted on. The assumption is therefore justified that the bond is adequate for sub-surface corrosion resistance requirements.

Porosity

Vitreous enamels may be found to have an initial porosity due to non-penetrating pores. The important consideration is that the initial porosity will not increase unless unusual chemical conditions prevail. These latter conditions will not increase porosity as much as they will completely destroy the coatings.

Absorption

Absorption will occur to the limit allowed by the porosity. The lack of fillers or organic materials which possess an ability to absorb moisture results in rapid initial absorption of moisture but no subsequent increase. With proper application the quantity of absorption is no criteria of corrosion resistance as it can not penetrate to the metal.

Dielectric Strength

Glass being a natural insulator vitreous enamel possesses this necessary quality to the extent that it is free of electric conducting impurities. A vitreous enamel specification should include a requirement of dielectric capacity. A manufacturer can easily meet such a requirement.

Temperature Resistance

Vitreous enamels having flow temperatures around 1000 degrees F. would not be affected by the highest temperatures to which pipe may be subjected after application of the coating. The lower ranges of temperature do increase the brittleness of vitreous enamel just as occurs with glass. However, the fusing of the vitreous enamel to the metal adds materially to its resistance to impact at the lower temperatures. At extremely low temperatures there would be no tendency to crack due to contraction as the coefficient of expansion and contraction is practically that of steel.

Fig. 2. Soil Stress Specimens. Left Soft Asphalt in Clay Soil. Right, Hard Asphalt in Silt Loam.

Impact Resistance

Vitreous enamel approaching glass in characteristics has an inherent brittleness requiring a somewhat greater degree of care during handling and installation. However the enamel is not so delicate that handling requires any impractical consideration. Vitreous enamel pipe may be dropped or struck and unless the blow is of unusual severity or concentrated as by a small sharp object will not be affected. Of the usual coatings vitreous enamel has the lowest resistance to chipping but is not excluded from consideration by this characteristic.

Abrasion

Abrasion being a consideration only previous to laying of pipe is not of major importance. Vitreous enamel has a high resistance to abrasion due to its hardness.

Soil Absorption

There is no tendency for soils to absorb vitreous enamel although there may be certain liquids in some soils which are solvents of vitreous enamels.

Chemical Resistance

The chemical resistance of vitreous enamels in domestic and industrial uses is well known. There is a considerable variety of compositions possible all of which may be termed vitreous enamels. Years of experimentation by manufacturers has determined which compositions are most suitable for sub-surface conditions. Naturally each manufacturer attempts to keep his composition a trade secret. Therefore specifications are necessary which places a responsibility on the manufacturer to furnish a vitreous enamel suitable for sub-surface conditions rather than designating a certain mixture. Experience has demonstrated that certain compositions are more suitable than others for acid soils. The manufacturer therefore often requests the average nature of the soils in a territory. It is preferable to secure a coating adaptable to all types of soils as previously explained. The acid soils present more difficulties to vitreous enamels than those which are alkaline. The nature of vitreous enamels allows accurate determination of the effects of soils by subjecting the enamel to burial tests of a few months to a year. Exacting measurements or microscopic examination would then disclose the action if any of a soil on the vitreous enamel. The variety of compositions possible results in a situation where failure of any one does not permit condemnation of the vitreous enamels as a class.

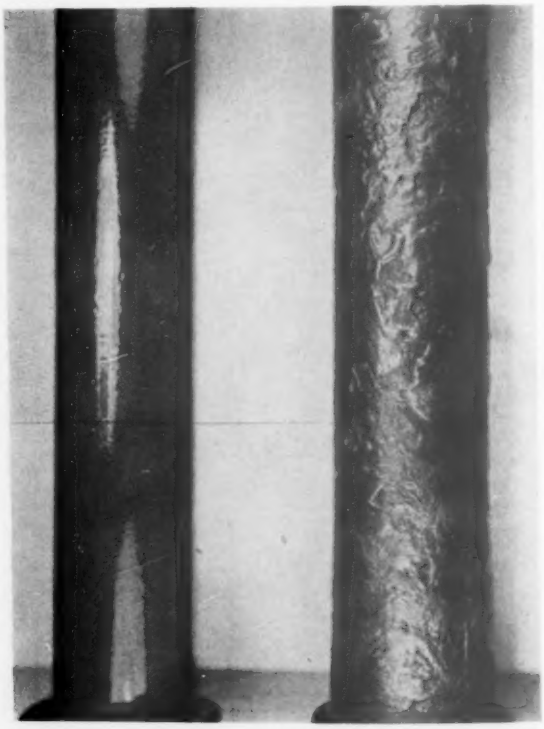

Fig. 3. Soil Stress Specimens. Left, Vitreous Enamel in Clay Soil. Right, Very Hard Coal Tar in Clay Soil.

Acknowledgment—*The pictures and some of the material in this section on vitreous enamels were taken from a report on "Investigation of Vitreous Enamels" by O. E. Andrus and W. G. Martin of the A. O. Smith Corp., Milwaukee, Wis. The paper was presented before the 1933 Bureau of Standards Soil Corrosion Conference.*

Practically all of the ingredients of vitreous enamel exist in the state in which they are normally found in nature. There is therefore no tendency toward gradual oxidation of the whole or any one of the ingredients.

ADHESION STRENGTHS OF PIPE COATINGS
VITREOUS ENAMEL 2370 to 3660 lbs/sq in.
COAL TARS 59 to 232 lbs/sq in.
ASPHALT 50 to 135 lbs/sq in.

Fig. 4. Adhesion Test Specimens.

Any chemical action which may tend to deteriorate a vitreous enamel would act upon the whole structure. This action practically eliminates any tendency for soil moistures to leach out one or more of the ingredients. Lack of any tendency for the enamel to oxidize or leach has resulted in vitreous enamels being particularly immune to deterioration by aging.

Vitreous enamels are insoluble in liquid or gaseous hydrocarbons. Therefore any leakage from gas or oil lines would not cause deterioration.

Bacteriologic action on vitreous enamel has not been the subject of research. Deterioration of vitreous enamels directly from this cause appears improbable. The products of bacteria decomposition being acid in nature may have an effect. The absence of practically any deterioration of the glazed surface of tile pipe in the most severe conditions indicates its resistant nature.

Soil Stress

The extremely high flow temperatures of vitreous enamels results in not only an apparent but real hardness at all ground temperatures. Soil stress of either a distortion or displacement type therefore has comparatively no effect on vitreous enamel.

Thickness

The thickness of vitreous enamel is important following the general considerations previously discussed. An average thickness of 1/32 of an inch will result in a flexibility of the enamel equivalent to that of the steel. Any considerable thinning may result in the surface pores penetrating to the metal and the resulting corrosion would break the bond of the surrounding coating.

Ductility

In thin layers a properly composited vitreous enamel will bend freely with the pipe without the development of craze or penetrating cracks. Any bending of a pipe beyond the elastic limit would undoubtedly cause failure

(Continued on page 66)

"NATURE'S RICHEST GAS COAL"

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MILWAUKEE WESTERN FUEL COMPANY, Milwaukee, Wisconsin

Gas Company Repossesses Gas Appliances

By
Leo T. Parker
Attorney at Law
Cincinnati, Ohio

A MAJORITY of gas companies maintain a retail department for sale of gas appliances. A large percentage of the sales are made on terms or credit and, therefore, an important consideration of gas company officials is avoidance of losses from this source.

It is well known that a seller may retain legal title to merchandise until the purchaser *fully* performs the assumed obligations. On the other hand, it is important to know that under certain circumstances the courts will look through apparent obscurities for the purpose of determining whether or not the true intent of the seller actually is to retain legal title to the goods, or merely use this method as a means to avoid other responsibility. Under the latter condition the contract itself is illegal and void.

Since there are many new and interesting phases of the established law on this subject, I shall endeavor to clearly explain the cause and outcome of the most important recent higher court cases.

Obligations of Conditional Contract

It is important to know that both the buyer and the seller are bound to comply strictly with the terms of a conditional contract of sale. If either party fails to do so, the other party may sue and recover damages for a breach of the contract.

For instance, in Stimpson Company v. Gawell, 158 N. E. 777, the record shows that a seller and a purchaser entered into a written contract of sale which provided that the buyer should *not* have title to the appliance until it was paid for in full. The contract further provided that if the purchaser defaulted payment the seller could repossess the appliance *without legal process*. The appliance was duly delivered and the buyer made the agreed initial payment. The balance was to be paid in twelve monthly installments.

The contract of sale also specified that the seller guaranteed the subject of the sale. Later the buyer refused to make future payments on the contention that the appliance was not satisfactory. When the seller demanded the purchaser to return it he refused to do so until the seller should return the initial payment. The seller sued to recover the balance due on the account.

The lower court held the buyer not liable, but the higher court reversed this verdict, saying:

"By the terms of the contract, upon default in any payment or other condition, the vendor (seller) was given the right to remove the property . . . as the defendant (buyer) refused to deliver unless a condition which he had no right to impose was complied with, he was guilty of conversion."

It is quite apparent that had the buyer returned the appliance when the seller demanded it, the buyer may have entered suit against the seller and recovered the initial payment *plus all damages which he incurred*. However, since in the contract of sale the buyer had agreed to return the appliance to the seller if the former defaulted in making payment, the buyer automatically breached the contract by refusing to return it. In other words, the purchaser could *not* legally refuse delivery of the appliance to the seller, while demanding repayment of the first payment.

The outcome of the above case clearly illustrated the liability of either the buyer or a gas company for failure to adhere strictly to the exact terms of the contract.

When Gas Company May Sue

A review of the leading higher court cases discloses that a gas company may sue a buyer for the *full* value of merchandise sold on a conditional sale contract only under three circumstances, as follows: (1) If the title to the goods has passed to the buyer and the latter wrongfully neglects or refuses to pay according to the terms of the contract; (2) if the purchase price is payable and due on a specified date without regard to the delivery, or transfer of title, the buyer has wrongfully refused or neglected to pay such price, even though the title in the goods has not passed; (3) if the buyer wrongfully refuses to accept delivery of the merchandise, and the seller thereafter notifies the buyer that he holds the merchandise for the buyer, even though the title in the goods has *not* passed to the buyer, provided the goods cannot be resold to another purchaser for a reasonable price, and provided, also, that the seller has no cause of action for damages for a refusal to accept delivery. (225 N. Y. S. 641.)

Of course, the seller of merchandise may file suit against a purchaser at any time the purchaser performs a breach of any sale contract. However, it has been held that the seller can only maintain a suit for the *value* of the goods under these above mentioned three conditions.

Distinction Between Chattel Mortgage and Conditional Sale

The outstanding characteristic of a conditional sale is the reservation of title by the seller. Under such a provision the seller is entitled to retake or recover possession of the property if the buyer fails to pay the purchase price or an installment thereof, or otherwise breaches the contract of sale.

In many instances it is far from easy to determine whether a transaction is a chattel mortgage or a conditional sale. Generally, the distinction between a legal sale of appliances and a mortgage of the same is that a sale is a transfer of the title for a definite price with conditions, whereas a mortgage is security for the payment of a debt.

On the other hand, if the transfer of title is intended merely to obscure the presence of a chattel mortgage, or if the debt is positively extinguished, or if the money advanced is *not* by way of a loan, and the seller merely has the privilege of refunding *if he pleases* and thereby entitling himself to a reconveyance of the appliance the transaction is a condi-

tional sale, and not a mortgage. This same rule is applicable to all other similar transactions.

For illustration, in the recent case of Works v. Carbonic, 113 So. 454, a buyer and seller signed a contract which purported on its face to be a lease, but which was held to be a sale. By its terms the buyer agreed to lease a machine from the seller for the term of twelve months. The buyer was to pay a total amount of $450, the first payment of $150 at once and the balance was to be paid in equal installments.

An important part of the agreement was that the buyer should pay the taxes on the machine while it was in his possession, and that, at the expiration of the twelve-month period, he should return the machine to the seller in good condition, or should have the option of purchasing it for $1, instead of returning it, provided he had complied with all of the provisions of the lease.

In holding the contract a valid contract of *absolute* sale, the court explained the law, as follows:

"The contract, though couched in the phraseology of a lease, is in fact a sale. It contains the essentials of a sale, to wit, a fixed price, which was the rental to be paid, a thing to be conveyed, and the consent of the parties to the conveyance at the price fixed. The contract, we think, clearly shows that what is designated as the rental to be paid for the use of the machine, for the period of one year, is, in fact, the purchase price to be paid for it, and represents the full value of the machine."

Therefore, when selling appliances under either a mortgage, absolute contract of sale, conditional contract of sale, or transferring under lease contracts, gas company officials should be certain to clearly include in the contract the true obligations of both the buyer and seller. Failure to do so may result in serious legal complications and heavy financial losses.

Law of Fixtures

It is important to know that, while valid provisions in a conditional contract of sale always are enforceable between the buyer and seller, yet in many instances such provisions are *not* effective with respect to third persons.

For instance, a gas company which sells an appliance and installs it in a house, may make a valid agreement, with respect to the purchaser, which entitles the company to remove the appliance if the buyer refuses to pay for it. However, if the thing sold is a legal "fixture" and a third person holds a mortgage on the house, the latter may prevent removal of the fixture from the building, irrespective of the agreement between the contracting parties. Also, the same rule is applicable to tenants to whom appliances are sold.

On the other hand, if the thing sold is *not* a legal fixture but a chattel, no one can prevent the gas company from removing it from the building if the purchaser breaches the conditions of the contract of sale.

For instance, in Madfes v. Beverly Corporation, 166 N. E. 787, it was disclosed that a gas company sold to the owner of an apartment building several gas stoves under an agreement which permitted the former to remove the stoves from the building if the purchaser failed to meet the agreed payments therefor. Each stove was attached by a simple coupling to the gas service pipe which delivered gas to the various apartments. Thereafter the owner of the building executed and delivered a mortgage upon the apartment house.

When the owner of the building failed to pay for the stoves, in accordance with the terms of the agreement, the gas company attempted to remove them from the house and the holder of the mortgage filed legal proceedings to prevent the removal on the contention that the stoves were legal fixtures. However, the court held the gas company entitled to remove the stoves, stating the following important law:

"Certain chattels have such a determinate character as movables that they remain personal property, after their annexation to real estate, independently of any agreement between the owner of the chattels and the owner of the realty which so provides. . . . Other chattels, such as the brick, stone, and plaster, placed in the walls of a building, notwithstanding an agreement to the contrary, conclusively become real estate after annexation thereto. . . . This doctrine was that it is *not* 'where the subject of annexation is such that . . . where the property could not be removed without practically destroying it, or where it or part of it, is essential to the support of that to which it is attached.' . . . Gas ranges, independently of an agreement to that end between buyer and seller, retain their character as personalty, after annexation. . . . According to our view of the evidence, these ranges were not so 'attached' to the building that, as matter of law, they become part of it."

The same rule of the law is applicable to mechanic's liens, as was held in the leading case of Corey-Scheffel Company, 13 S. W. (2d) 1009. Here it was disclosed that a company sold stoves to the owner of a building, *after* a mortgage on the real property was properly recorded, under a contract that the seller retained title to the range until the purchase money should be paid. This contract was a legal chattel mortgage and was properly recorded.

Later a mechanic's lien was filed against the building and litigation developed whether the seller of the stove was entitled to remove it from the building to secure the unpaid purchase price.

It is interesting to observe that the court held the seller entitled to remove the stoves because they were attached in a manner so as not to be legal fixtures.

Therefore, in order that gas company officials may avoid chances of losses resulting from installation of unpaid for appliances, the important thing is to be able to distinguish between legal fixtures and mere chattels.

First, it is important to know that modern courts all agree that the most controlling tests of the question whether property connected with real estate is to be deemed realty or a mere chattel, removable at the pleasure of the owner, is the manner of attachment and intention of the parties. Of course, if either the chattel mortgage or conditional contract of sale is not recorded the gas company may suffer financial losses.

For illustration, in Knoxville Gas Company, 32 S. W. (2d) 1054, it was shown that a gas company sold gas stoves to a construction company which constructed an apartment building. The stoves were attached each to a single gas or supply pipe by means of a threaded "union" or "collar." The chattel mortgage was not recorded, but clearly provided that the stoves were to remain the property of the gas company until paid for by the purchaser.

Soon afterward a person purchased the building and, although the gas stoves had not been paid for, the court held that the gas company could not remove them from the building because the chattel mortgage was not recorded and the purchaser of the building had no knowledge of its existence. This court said:

"If the purchaser of an apartment house had to ascertain, at his peril, whether every electrical device, gas equipment, kitchen cabinet, and the

(Concluded on page 62)

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with CARBOSEAL ANTI-LEAK

Trade-Mark

THE use of Carboseal anti-leak has become a routine procedure in the maintenance programs of over 200 gas companies. Many utilities have completely treated their entire distribution systems. Nation-wide experience indicates that the average cost of Carboseal anti-leak required per mile of 3-inch equivalent cast-iron main is under $100. Savings in terms of gas formerly lost have shown returns of 49 to 500 per cent on the investment.

Carboseal anti-leak corrects leakage in dry-gas distribution systems by permanently moistening and swelling the jute in cement or lead-caulked bell and spigot joints. Joints treated five years ago, and in contact with dry gas since then, remain 100 per cent tight on the soap test. Meter tests made on cast-iron mains, where no services were connected, showed complete elimination of leakage; and on mains with connected customers, showed leakage reductions from 50 to 95 percent after Carboseal anti-leak treatment. In general, any remaining leakage was found to be in the services.

From 2,000 to 5,000 feet of main a day can be treated without interrupting gas service. Carboseal anti-leak contains no volatile diluents which evaporate, and costs much less to apply than other lasting methods of stopping cast-iron joint leakage.

For further information write for Carboseal anti-leak bulletins which will be gladly sent without obligation.

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PRODUCERS OF SYNTHETIC ORGANIC CHEMICALS

Carbosealing Cast Iron Mains

By

Aaron Bush

Alabama Gas Company
Birmingham, Alabama

ONE of the major problems which has confronted engineers and operators of cast iron distribution systems converted from manufactured to natural gas has been the appreciable increase in leakage which usually occurs after conversion. The method most widely used to correct this condition, in most instances has been only partially effective. As a rule, it tends to retard the rapid rate of increase in unaccounted-for-gas which would otherwise occur. It is seldom that any material reduction in leakage has been effected without resorting to costly clamping of mains.

A new method for treating leaking joints in converted systems with a liquid known as "carboseal" has been recently developed, which shows considerable promise. In converted cast iron systems, leaking joints are generally caused by the dehydration and consequent contraction in the volume of jute packing in the bell and spigot joints. Carboseal is a liquid compound which has the property of expanding this jute packing by approximately one-half its volume, thus sealing the joints against leakage.

It is the purpose of this paper to present the experience of our group of properties in developing practical methods for introducing carboseal into such systems. In addition, there is outlined cost and experimental data, together with a discussion of the problems we have encountered in the use of this material. Before describing our work with carboseal, it would be well to review briefly the steps previously taken by our company in controlling leakage, and the results obtained.

Leakage Control by Conditioning Gas

Until the advent of carboseal, the only economically practical method for preventing the rapid drying out of joints in converted systems was to condition the natural gas. This consists of treating the gas in such a manner that its effect upon the joints would be similar to that of manufactured gas. Conditioning, or the addition of moisture in the form of steam (rehydration) and oil as a fog or vapor, has been almost universally adopted by gas companies confronted with this problem.

We have been conditioning natural gas in our systems from the time it replaced manufactured gas. The most efficient types of saturation controllers and fogging equipment have been used. In addition to the careful and systematic operation of the conditioning equipment, considerable work has been done in clamping leaking joints and renewing services. Despite such ceaseless vigilance in combating leakage, we find that today unaccounted-for-gas has increased by one-fourth to as much as one-half in practically every one of our converted systems as compared with manufactured gas operation. Our leakage work in clamping joints indicates that even with the conditioning of gas, the joints are slowly, but nevertheless surely, drying out. We have found that in addition to the continued conditioning of the gas, we must make ever-increasing expenditures for maintenance in the form of leakage surveys and clamping of joints to keep unaccounted-for-gas within reasonable limits.

The conditioning of gas has other operating disadvantages. Water collects in some of the meters, services and fuel lines, causing additional complaint expense from freeze-ups and water stoppages. Water and fogging oil getting into meters materially shortens the life of the diaphragms. Meters will operate much more satisfactorily with appreciably longer life if dry gas is used instead of conditioned gas.

There is no denying the fact, based upon our experience of the past eight years, that in most cases the conditioning of natural gas is neither a complete nor permanent solution of the leakage problem. Until recently, it was the only economical method available for preventing the rapid deterioration of joints which would otherwise occur.

When carboseal was brought to our attention in 1936, we immediately became interested. The possibility of effecting a substantial reduction in leakage by introducing the liquid into the mains seemed worthwhile investigating. We began treating small test sections, using the "gravity or filling station" method.

Although a satisfactory reduction in leakage was obtained in these sections, it soon became evident that the gravity method was not very feasible or practical for our group of properties. Practically all the large diameter feeder mains were under paving; the majority in relatively flat terrain. The records on the grades of such mains were meager, to say the least. The necessity for frequent filling stations, checking for low spots, lost drips, entailed the breaking and replacing of considerable paving at relatively high cost. In addition, a substantial portion of the carboseal poured into stations was "lost" due to sags in mains and from other causes. The results of these preliminary tests indicated that the gravity method would not prove very practical under our particular operating conditions. At best, it would be a slow, costly process for treating our systems, greatly exceeding the original cost estimates.

A more effective method was essential, if the desired results were to be attained and a reasonable return obtained on the expenditure made for this work. At about this time, in a paper presented at the Distribution Conference of the American Gas Association, at Washington, D. C., (April 12-14, 1937), Mr. R. E. Finley described the so-called "hose" method of treating mains with carboseal. This is to push a ⅜" rubber hose with a suitable nozzle into the main, using a flat steel tape under the hose to obtain the necessary stiffness. Carboseal is placed into a storage tank and forced through the hose and nozzle by air pressure. The hose

Presented at the Annual Convention of the Southern Gas Association, Dallas, Texas, February 16-18, 1938.

is slowly withdrawn as the carboseal is sprayed into the main.

We quickly found that this was far superior to the gravity method, but it too had its limitations. It worked very well at one of our properties, but was not so effective in others. In many instances the hose would kink or coil up when as much as 40 or 50 feet had been inserted in either direction from a hole. As the great majority of mains were under paving, the cost of breaking and replacing paving every 80 or 100 feet became quite a large item.

Carboseal Treatment by the Hose Method

We set out to double, if possible, the distance which could be carbosealed between openings. The result of our many experiments was the development of two general methods for introducing carboseal by the hose method. Both are equally effective as to feet of main treated per day, while the costs per joint are comparable.

At Montgomery, a refinement of the method outlined by Mr. Finley has proved very satisfactory. We use a 106-foot length of flat steel sewer tape, 1⅛" x ⅛", every ten feet of which is marked with a punch. At one end of the steel tape is welded a nozzle from a fruit tree spray, to which the end of the hose is attached. The hose is a 125-foot length of ¾" O.D.—5/16" I.D. oxygen hose. Taps in the main are made 1¼" two hundred feet apart. A 20-gallon steel tank for carboseal is mounted at the rear of a portable air compressor and connected to the air tank. On the carboseal tank is placed a gauge glass, behind which is mounted a scale graduated to show the required amount of carboseal for each 100 feet of main. A different scale is used for each size of main. A connection is placed at the bottom of the tank for the hose. The steel tape, with the hose attached, is pushed into the main until 100 feet of hose has been inserted. The valve is opened and carboseal is forced through the hose and nozzle by air pressure on the tank. As the tape is withdrawn, a signal is given when each ten-foot mark is passed and the scale at the gauge glass is checked for the amount of carboseal applied. The speed of the tape is thus adjusted every ten feet to obtain the correct amount of carboseal. When the hose has been withdrawn until only the nozzle is within the main, the hose is swung around through 180 degrees and pushed into the main 100 feet in the opposite direction, thus treating 200 feet from a tap.

The crew consists of a foreman and twelve laborers. The two men operating paving breakers begin work one hour before the balance of the crew. All of these men are used on excavation until sufficient holes have been opened. The four men comprising the carboseal crew stop excavating and begin treating mains. As excavation is completed, the remainder of the crew start backfilling openings where carbosealing has been completed. Thus all phases of the work are completed by the end of the day, all openings being backfilled the same day.

At Anniston and Gadsden, where conditions differ somewhat from those at Montgomery, a modification of this method has been used with equal, if not superior, results. Openings three feet by three feet exactly 190 feet apart are made, being tapped 1¼" at these points. A sewer cable ¾" x ⅛" and 200 feet long is used. A small hole is drilled at one end of the cable, to which is tied a length of cord 30 to 60 pound test. This end of the cable is pushed into the main a distance of 190 feet. The cord is then fished out of the second opening by means of a wire hook. The carboseal hose is a 200 foot length of ⅞" O.D.—½" I.D. water hose. The nozzle is a ⅜" galvanized cap drilled with eight to ten 1/64" holes around the circumference.

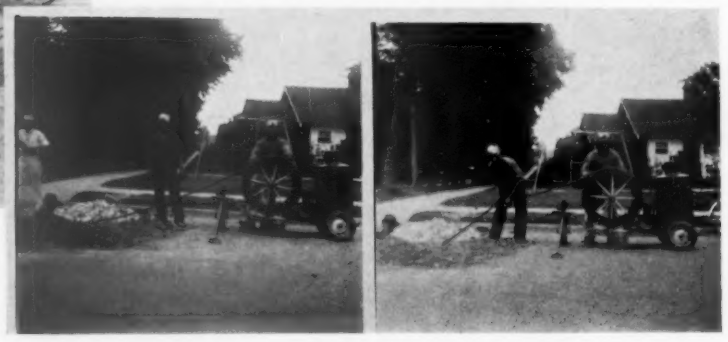
The free end of the cord is tied to the hose just back of the nozzle. The nozzle is inserted into the tapped hole and the cable pulled out, bringing the hose into the main. When the sewer cable has been pulled out of the main, the cord is cut. Carboseal is then turned on to the hose from a storage tank by air pressure. The hose is slowly withdrawn at such a rate as to introduce the proper amount of the liquid per ten foot section of main. The hose may have suitable markings painted every ten feet for checking the rate of carboseal flow. Excessive loss of gas is prevented by inserting the hose through a one foot section of 1½" radiator hose, forced partly into the main. A cotton rag is wrapped around the carboseal hose and the other end of the radiator hose.

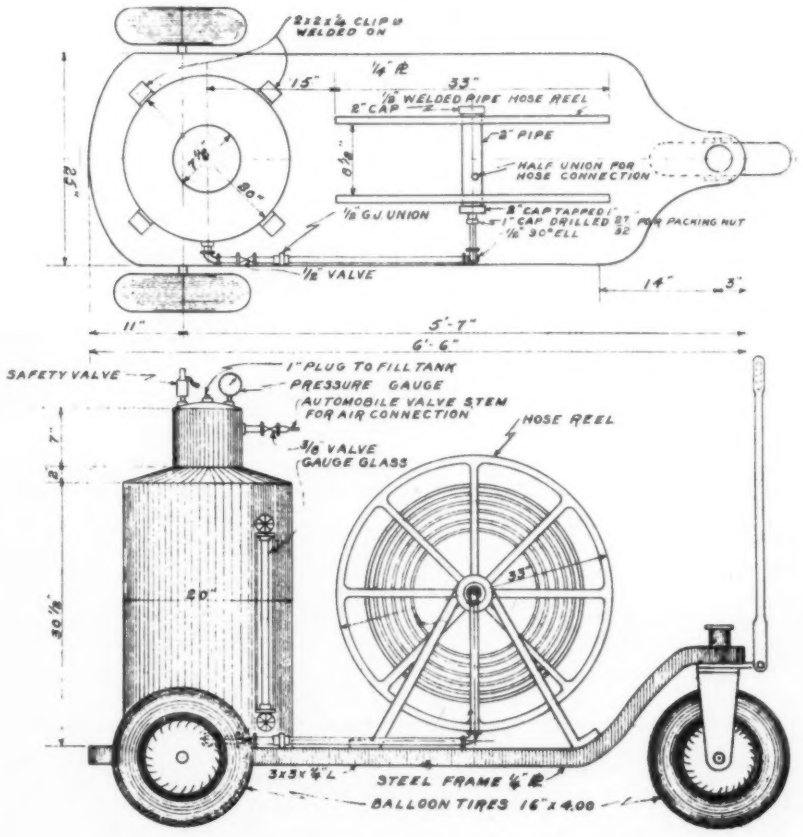
Special Truck Developed for Hose Method

To facilitate the work, we made use of a carbosealing truck developed during our early experience. Details of this equipment are shown on the attached blue print. It consists of a 30 gallon storage tank for carboseal, together with a reel for the hose. The tank and reel are mounted on

Above: Left, Breaking paving, using gasoline hammer. Indicates size of opening. Right hose of carbosealing machine being inserted into main. Hose is attached to plumber's rod, and pulled into the main.

Below: Left, View showing position of carbosealing machine when inserting or withdrawing hose. Right, same general view except here the hose is being withdrawn from main. Helper is wiping hose to remove any carboseal or other material which may have been picked up from main or ground.





Plan and Elevation of Carboseal Truck with Pressure Tank and Hose Reel.

a steel base, supported tricycle fashion by three roller bearing, small diameter, rubber tired wheels. A forked metal rod, attached to the front axle permits steering and hauling the machine. The unit was developed for systems without portable air compressors and for use at points where compressors are available but needed elsewhere. After the storage tank is partly filled with carboseal, it is pumped with air to a pressure of 60 lbs. per square inch at the plant or a convenient filling station. The pressure is generally sufficient to operate until noon, when the tank is refilled (if necessary) and pumped up again. Where no station is convenient, it is a simple matter to place the machine on a truck and drive to one.

The carboseal truck has materially increased the speed of the crew on the work, at times as much as 25%. It is small, compact, easily pulled by one man. Its use releases the compressor for full time operation in breaking paving, operating air tampers for back fill, or other jobs. Without the truck, the compressor has to be pulled back and forth on the job a thousand feet or more between paving breaking ahead and carbosealing to the rear.

The scheduling of the work at Gadsden also differed in certain respects from that at Montgomery. As the main records on many streets were incomplete and often inaccurate, we used a total of nine men and a foreman, divided into two crews. The foreman, generally with two or three laborers, located the main with a pipe locator and laid out the holes. In the case of paving, he operated the paving breaker, which was a gasoline hammer. The size of this crew varied, depending upon the ease of breaking paving. The crew would endeavor to keep several holes ahead of the carboseal crew, which included laborers for excavating, tapping, carbosealing, and back fill. In general, opening holes and tapping the mains are the real work involved, as it is not at all difficult to carboseal mains as fast as the holes can be opened and the mains tapped. We have averaged 1,500 to 2,000 feet of main per eight hour day in paved streets and approximately 2,600 feet a day in unpaved streets. Only one treatment has been found sufficient to seal leaking joints, using either of the two methods outlined.

The second method described is better adapted for treating systems where a large proportion of the mains are three inch and four inch diameter, particularly where such mains contain tar, naphthalene, rust or other hard deposits. Since the carboseal is sprayed ahead of the hose as it is being withdrawn from the main, the outside of the hose remains relatively free of the liquid, thus reducing waste. In the event the hose or cable becomes entangled in the main, the cord breaks under excessive tension and no damage is done. The hose is pulled out and we try again. The first time this was used, the hose was wired to the cable. When it refused to clear an obstruction, three men pulled on the cable, very neatly pulling the hose in two.

There are a number of principles which we found by experience were applicable to both methods. It is desirable to use a hose with as large a diameter as possible, taking into consideration the diameter of the main to be treated. The larger diameter hose requires much less air pressure on the storage tank to force carboseal through the nozzle. The spray obtained from the larger hose with the lower pressure is also more satisfactory than with higher pressure on a smaller hose. The hose used with the carbosealing truck should be inexpensive water or garden hose, as

Side view of Tank and Reel. The connection from Pressure Tank leads to shaft of the Hose Reel; see the diagram for detail.

it must be replaced periodically due to wear and tear in being pulled through the main. It is also advisable to filter the carboseal through double cheese cloth or chamois when pouring into the storage tank. The inside of the tank should be sand blasted after welding to remove scale. Even with all these precautions, the carboseal removes fine loose particles of

Table I
Carbosealing Cast Iron Mains
Cost of Treatment Using Hose Method of Application

Size Main	Feet of Main	Miles of Main	CARBOSEAL Gallons per 100′	Lbs. per Mile	Lbs. per Mile 3″	COST PER MILE OF MAIN Carboseal	Labor and Incidentals	Total (Excluding Paving)	Paving	Total Including Paving	COST PER MILE 3″ Excluding Paving	Including Paving
Anniston, Alabama												
3″	1,500	0.28	1.33	650	650	$138.	$150.	$288.	$128.	$416.	$288.	$416.
4″	22,200	4.20	1.64	800	600	170.	143.	313.	128.	441.	235.	331.
6″	2,000	0.38	2.15	1050	525	222.	145.	367.	140.	507.	184.	254.
Gadsden, Alabama												
3″	1,347	0.26	0.82	400	400	85.	142.	227.	150.*	377.	277.	377.
4″	26,250	4.97	0.94	458	344	97.	125.	222.	150.*	372.	167.	279.
6″	5,576	1.06	1.52	742	371	157.	142.	299.	175.*	474.	150.	237.
Montgomery, Alabama												
4″	154,954	29.40	2.30	1125	842	238.	112.	350.	236.	586.	263.	440.
6″	16,400	3.11	3.10	1515	758	322.	94.	416.	220.	636.	208.	318.
10″	4,925	0.93	3.78	1850	555	394.	122.	516.	250.	766.	155.	230.
12″	2,000	0.38	3.60	1760	440	373.	126.	499.	235.	734.	125.	184.
16″	1,200	0.23	4.50	2200	412	463.	187.	650.	275.*	925.	122.	173.
Grand Total												
3″	2,847	0.54	1.09	532	532	113.	146.	259.	137.	396.	259.	396.
4″	203,404	38.57	2.05	1000	750	212.	117.	329.	214.	543.	247.	407.
6″	23,976	4.55	2.64	1290	645	274.	110.	384.	202.	586.	192.	293.
10″	4,925	0.93	3.78	1850	555	394.	122.	516.	250.	766.	155.	230.
12″	2,000	0.38	3.60	1760	440	373.	126.	499.	235.	734.	125.	184.
16″	1,200	0.23	4.50	2200	412	463.	187.	650.	275.*	925.	122.	173.

*Even dollars only. Note: * Estimated.*

rubber from the wall of the new water hose, causing stoppage of the small diameter holes in the nozzle. To prevent delays from this source, we kept on hand a number of such nozzles, using them in rotation. The holes of all nozzles removed were cleaned with a fine pin and the nozzle washed in kerosene to remove grease. Finally, it may be necessary to replace the plumbers rod after three or four weeks of continuous use, as the rod gradually loses its temper.

Carboseal contains phenol or carbolic acid and therefore irritates the skin when in contact. We found it advisable to provide rubber aprons and rubber gloves to all laborers in the carboseal crew, as well as to those who handled the liquid. In addition, the shoes of such men should be inspected to insure that uppers and soles are unbroken.

Quantities Used and Cost of Treatment

We have tried various quantities of carboseal per 100 feet of main, depending upon circumstances. The quantity in gallons per 100 feet of main treated, under average conditions, is as follows:

For three-inch main, 1.0 gallon; four-inch, 1.5 gallons; six-inch, 2.0 gallons; eight-inch, 2.5 gallons; ten-inch, 3.0 gallons; and twelve-inch, 3.5 gallons. At Montgomery, the leakage was somewhat above that of our other systems and consisted of small leaks in many joints. We therefore used considerably more than the average quantities of carboseal per 100 feet of main listed above.

We have treated a total of 45.2 miles of main (66.9 miles of three-inch equivalent) in three of our systems, practically all by the hose method. The details of mains treated as well as the average cost of treating various size mains is outlined in Table I as shown above. These costs were obtained with colored labor at the prevailing rates. There was no uniformity in the cost of replacing paving because of the wide variation in types.

Due to various unexpected developments, our carboseal program did not get actively under way until midsummer of 1937. We have treated all unclamped cast iron mains in three of our operations. The work was completed too late in the season for accurate tests to be made on the reduction thus effected in unaccounted-for-gas. The few tests that have been made are detailed in Table II below:

Carboseal is hygroscopic. It will pick up a large percentage of water from conditioned gas, as well as from mains. The carboseal absorbed by a joint under such circumstances can be so greatly diluted with water that the amount of carboseal present may be insufficient to seal a joint. The excess of liquid would also run into the drips, carrying a considerable portion of the carboseal with it. Carboseal, therefore, should not be used where rehydrated gas is being distributed. As all of our properties were maintaining a relative humidity of 80% to 85% on the conditioned gas, it was essential that certain preliminary steps be taken prior to the introduction of carboseal.

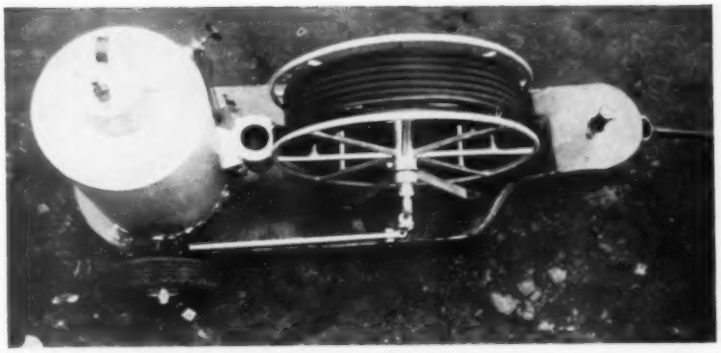
Thirty to forty-five days prior to the treatment of a district, we discontinued the conditioning of gas in that district. In small systems we discontinued all conditioning at one time. In our larger operations we discontinued conditioning to the outlying districts, but continued the operation of conditioning equipment in the central or business area. While

Table II

Size of Main	Feet of Main	Method of Treatment	COST OF TREATMENT Total	Per Mile 3″	LEAKAGE CU. FT. PER HR. Before	After	Reduction	Reduction MCF per Year	Saving Dollars per Year	Return on Investment P.C.
4″	1,200	Gravity	$ 34.	$113.	84	0	84	736	$170.	500.
4″	6,900	Hose	288.	165.	150	80	70	613	141.	49.
4″	11,900	Gravity	419.	135.	315	140	175	1,534	330.	79.
..	43,800* (3″ Equiv.)	Gravity	1,500.	180.	500	200	300	2,628	526.	35.

*Note: * This test made by Macon Gas Company, at Macon, Georgia.*

the outlying districts were being carbosealed, rehydration in the central portion was discontinued to permit excess moisture to be absorbed by the dry gas. The business area was then treated. Conditioning is not resumed after a district or system has been treated, since the moisture would wash out or dilute the carboseal in the joints.



The Pressure Tank and Hose Reel of the Carboseal Truck are seen in this Bird's-eye view.

Dry Gas Affects Meter Proof

One would think that after carbosealing a system, the engineer may well consider his troubles over. Unfortunately, such is not the case, for the cessation of conditioning introduces still another new problem; namely, the effect which the change from conditioned to dry gas will have on the proof of consumers' meters. Moisture and oil fog have a deleterious effect on meter diaphragms. The oil in the diaphragms will at times absorb a small quantity of moisture from the conditioned gas and, again, may give up moisture to the gas, depending upon temperature and relative humidity of the gas. This oil will also be diluted by the oil fog, since the vapor pressure of oil fog is many times that of the relatively heavy diaphragm oil.

Apparently the net effect on the meter, as long as conditioned gas continues to be distributed, is a slight shrinkage of the diaphragms. The result is a tendency for the meter to prove slightly fast. What happens when conditioned gas is discontinued and dry gas substituted, as is the case after carbosealing a system? Undoubtedly the dry gas would absorb both moisture and light fogging oil from the diaphragms, causing a relatively more pronounced shrinkage than occurred with wet gas. There would be an appreciable increase in the number and range of fast meters. Such is the analysis the engineer would work out on paper. How fast or how severe this change in proof would be, we could only guess. In view of the requirements of regulatory bodies relative to refunds on fast meters, the extent of such possible inaccuracies became quite important. How could this be determined in advance?

To find the answer, a practical experiment was carried out at the Mobile Gas Service Corporation, Mobile, Alabama. Our company participated and cooperated in this test. From the meters in service, we selected seventy-two five-light tin meters, equally divided into four "age" groups. The first group consisted of eighteen meters in which the diaphragms had been in use only one year; the second group, two years; and so on. We were careful to select meters from all points in the city and to take those which had been in use at only one location during the age period in question. By age of meters is meant the number of years since new diaphragms were installed, or old diaphragms hand-oiled.

The meters were assigned test numbers and were all proved. A representative one-third of the meters had four-fifths of a pint of meter diaphragm oil introduced with a squirt gun into the bottom of each diaphragm chamber, through a small hole punched in the side near the bottom. No attempt was made to work the oil into the diaphragms by rotating the meters. We proceeded on the basis as we would if the meters were oiled in the field. The meters were arranged on a rack manifold. Fifty thousand cubic feet of dry natural gas was passed through each of the meters at a rate of one hundred cubic feet per hour during approximately twelve daylight hours, and ten cubic feet per hour for the night hours. This simulated to a certain extent, and in an accelerated manner, the conditions under which the meters would operate in actual practice.

All the meters were then removed and proved. Another third of the meters were treated with oil in a similar manner. A second 50,000 cubic feet of dry gas was then passed

Table III

Carbosealing Cast Iron Mains

Summary of Meter Errors—Special Meter Test on Dry Natural Gas

	METER ERROR P.C.			DIFF. IN ERROR	
	Start	At 50,000 Cu.Ft.	At 100,000 Cu.Ft.	Start To 50,000 Cu.Ft.	Start To 100,000 Cu.Ft.
Meters with Diaphragms One to Four Years Old:					
One Year Meters					
Oiled at start of test	1.9*	.7*	.1*	1.2	1.8
Oiled at 50,000 Cu. Ft.	1.0*	.2*	.6	.8	1.6
Not Oiled	1.1*	.5*	.6	.6	1.7
Two Year Meters					
Oiled at start of test	.4	.6	1.1	.2	.7
Oiled at 50,000 Cu. Ft.	.3	1.0	1.5	.7	1.2
Not Oiled	.0	1.2	1.8	1.2	1.8
Three Year Meters					
Oiled at start of test	.3*	1.1	1.8	1.4	2.1
Oiled at 50,000 Cu. Ft.	.7	1.7	1.4	1.0	.7
Not Oiled	.2	1.6	1.7	1.4	1.5
Four Year Meters					
Oiled at start of test	4.6	4.3	4.8	.3*	.2
Oiled at 50,000 Cu. Ft.	5.8	6.4	5.9	.6	.1
Not Oiled	1.1	1.7	2.0	.6	.9
Meters with Hand-Oiled Diaphragms:					
Four Year Meters (Diaphrams 9 Years Old)					
Oiled at start of test	2.5	2.8	3.7	.3	1.2
Oiled at 50,000 Cu. Ft.	1.8	2.3	1.4	.5	.4*
Not Oiled	.5	2.9	3.4	2.4	2.9

Note: Meter Error is taken as average of open and check test.
** Indicates red figure.*

through each meter under the same rates of flow. The meters were proved for the third time. Thus, we had seventy-two meters through each of which 100,000 cubic feet of dry gas had been passed, or as much gas as is normally consumed by a residential customer in approximately two years. We believed that this should be sufficient time to definitely establish trends of meter inaccuracy, if such would occur under the conditions as outlined.

Results of Special Test on Meters

The meters were opened and the diaphragms examined. The diaphragms in practically every one of the one and two-year meters showed a loss of oil, due to the drying out action of the gas. There was slight but definite shrinkage in the diaphragms of all the three and four-year meters. The extent of the shrinkage naturally increased with the age of the meter. The leather in meters where the diaphragms had been hand-oiled three and four years previously was dead and flabby, cutting under the pressure of a sharp fingernail.

A summary of meter proofs is listed in Table III on previous page. It is evident from the meter errors in the Table that the action of dry gas causes a gradual change in proof in the direction of fast meter. The extent of the change (maximum 2.9%) varies with the age of the diaphragm. The increase in meter error is retarded by the oiling of meters. Although the results are not very consistent or conclusive, the change in proof of meters not oiled during the test appears to be approximately twice that of the oiled meters.

The results clearly indicate the advisability for prompt replacement of hand-oiled diaphragms three and four years old. Our conclusions relative to the other meters are not very well defined, due undoubtedly to the relatively small percentage of total meters used in the test. However, the next step would appear to be the immediate oiling of meters in which new diaphragms were installed four years ago. These should be followed within a two year period by the three-year, then the two-year, and the one-year meters, in turn. Previous experience in oiling meters in the field indicates that much more satisfactory results will be obtained if the meters are oiled in the shop by pouring hot oil through the valves.

The question naturally arises as to the permanency of the carboseal treatment. Frankly, we do not know how long the system will remain tight. Based upon the excellent condition reported for joints treated five years ago, present indications point to a life of at least ten to fifteen years. By that time, methods may be available for periodically fogging carboseal into the system through suitable foggers. This would permit introducing sufficient additional carboseal to make up for losses which will undoubtedly occur with time, and thus maintain the system reasonably tight. We understand that experimental research on this phase of the subject is now being conducted. Regardless of whether or not it proves successful, we feel reasonably certain that our expenditures for carboseal will be more than justified by the reduction thus obtained in unaccounted-for-gas.

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New Gas Fired Kilns

To further improve the already excellent quality of the glass tank refractory blocks made by the Findlay Clay Products Co., Pittsburgh, Pa., this concern recently installed new gas fired kilns. These replaced the old coal-fired kilns. The brand of glass tank refractory block has a remarkably long life. The gas kiln installation was made with the cooperation of the Industrial Gas Department of the Manufacturers Light & Heat Co., Pittsburgh.

Gas Goes Forward

"The elasticity of gas as a fuel is its greatest safeguard. Its reliability and efficiency cannot be denied. It is going to take far more than the development of electricity to displace gas in the confidence of the public. The very fact that 125 years of existence finds the industry forging ahead in spite of a comparatively youthful and therefore energetic opposition is its finest recommendation. Fortunately, energy is not the prerogative of electricity. In our industry age and experience are now marching along, not independently but in a spirit of cooperation and with a definity of purpose which may well be the envy of others."—Sir David Milne-Watson, Governor of The Gas Light and Coke Company, London.

Current Certainties in a Time of Low Visibility

By

Prof. Erwin H. Schell

In Charge of the Department of Business and Engineering Administration, Massachusetts Institute of Technology

IT goes without saying that the conduct of any business through periods of prosperity and of depression calls for an underlying policy whose principles are not affected by swings of the business cycle. It is of these fundamental policies that I shall speak. Despite present confusions and uncertainties there are tangible elements of assurance upon which future programs may be based.

Uncertainty is not new in human affairs. Since the beginning of time men have faced its presence and encompassed the difficulties which it has brought. They will do so again. The technique is simple. First, acknowledge its presence. Second, determine its scope and the extremes of its probable influence. Third, design a program with a flexibility which encloses these possibilities. Thus uncertainty becomes assimilated and the hazards of fear and of surprise removed.

Executives are today planning future business activities by strategic rather than structural methods. The program is no longer a schedule but a campaign; the planning is more than a technique of analysis, it is a technique of tactics. It is true that such methods demand more of foresight and study, for the solutions to a variety of alternatives must be prepared and made ready for possible selection and immediate use. Nevertheless, such procedures while expensive are entirely practicable and will tend to become the rule rather than the exception. But my mission is to discuss certainty rather than uncertainty.

First, we must admit the certainty that *we are in the presence of constant and relatively rapid change.* Of course, change has always been with us. Yet to accept its presence is to establish our thinking on a dynamic rather than a static basis. Under such circumstances trends rather than current conditions must be the material with which we work, and indeed the latter certainties upon which we shall build our policy will be seen to take this dynamic form.

A second certainty is that *human wants are increasing both in variety and intensity at an unprecedented rate.* New energetics of mass publicity have broadcast the latest advances in standards of living and these have been capped by less real but more glittering visions of political Utopias to come. Thus an enormously elastic market has been created, a market quickly responsive to improved ratios between quality and price. This writing on the industrial wall is so plain that it is folly to disclaim the principle. Come weal come woe the manufacturer who prepares specifically to make constantly higher quality available at constantly lower outlay will assure the future security of his business. We know of no sounder principle than this.

The third certainty is that *organized research has become the dominant competitive weapon for the individual establishment.* And more than research, the development of a new idea from its genesis until the time when it meets the acclaim from the consumer is a fresh art, the knowledge of which is enabling many companies to establish entirely new competitive frontiers. It is safe to say that within the next decade the company which cannot introduce into its processing the new product, the new design, the new formula with as great facility as it introduces raw material into its process will be definitely obsolete from the point of competitive armament. The measure of this need in any particular establishment is simple. The rate at which older markets wane establishes the rate at which newer markets must be developed.

The fourth certainty is born out of uncertainty. It is that a *major resource is increasingly to be found in the good will of vendor and of customer, of community and of the public, as well as of stockholder and of employee.* Indeed, the importance of good will is so great as to permit it to share honors with undistributed surplus. The reason is clear. Those uncertainties in the industrial future which give greatest concern at present are of a nature which will affect industry and the public as a whole. Therefore, should vicissitude come, all parties will be affected; and under such conditions existing good will serves to hold friends even more closely together. No company, in these times, can afford to overlook these values. Lay up your treasures in good will, for in no other form are your possessions more inviolate. Such resource cannot be purchased but must be earned. It is the reward of perspiration rather than persuasion, the derivatives of sincere effort rather than superficial flattery. It is significant that one of our most extraordinary industries, that of broadcasting, owes its spectacular growth to application of the deeper principle which reads "Give and ye shall receive."

The last yet most impelling of all certainties is that *industry as it is now constituted and is now evolving must and surely will go on.* In no industrialized country, whatever its ideology, has manufacturing been excommunicated. Again, the reason is clear. It has been said that one-half the people of this earth would perish within a matter of months should the wheels of industry stop turning. We live not only by the machine but because of it. Future policy must therefore be one which, though flexible to change, is designed for continuity. To give up in despair is only to make way to another.

These five certainties,—the increasing rate of change; the rapid growth of wants for the better and cheaper; the striking potency of research; the saving grace of good will; and the necessity of continuity,—as they bear upon the industrial scene, are realities in which executives may place their trust. And to heed their presence is not only a privilege but a duty.

Presented at the 12th Annual Business Conference New England Gas Association, Boston, Feb. 24-25, 1938.

Marketing of Utility Service and Prudent Investment

By

C. O. Ruggles

Professor of Public Utility Management
Harvard Graduate School of Business Administration

IN discussing the topic assigned to me on your program, the Marketing of Utility Service and Prudent Investment, emphasis will be given to the following five points. First, a word about the early character of public utility markets; second, early misunderstanding of the market for public utility service; third, the effect of misunderstanding of utility markets on rate making; fourth, brief consideration of prudent investment or other theories of a rate base in relation to load building; and finally, the need for a constructive program concerned with marketing analysis, rate making, and improvement of regulatory commissions.

The early markets for utility service were very much restricted. In fact, it was not a public service if by that is meant that it was generally used by the public. It was rather a luxury service. Aside from water, gas is the oldest utility service and at the outset it sold at such high prices that it was used only by the very well to do. Strangely enough we insisted upon so much competition among our first gas companies that our early markets were divided and further subdivided by numerous competing gas companies within the same community. The very word "consolidated" in so many present gas company names shows that eventually these competing companies were finally combined. This was, of course, a move in the right direction, but the elimination of competition had some unfortunate results, because it led both the gas companies and the public to feel that these utilities had a monopoly of their markets.

To understand a market for a given commodity or service, it is necessary to understand the economic forces that affect both the supply and demand for such a commodity or service, or for what is an effective substitute for either of them. As we now review early gas rates, we can see that they were "legal or franchise rates" rather than loadbuilding rates. Not only were these rates too high but they did not take into consideration the fact that the market for gas is not homogeneous but rather quite hetereogeneous. The gas companies were not the only utilities which made the mistake of assuming that they could apply uniform rates to the entire market. For example, the telephone industry soon found that uniform or flat rates meant a wasteful use of the service by some subscribers and no use of it at all by those who could not afford to pay the advancing rates which the unsound marketing policy had made it imperative to charge. In New York City, for example, the uniform rate policy had necessitated one rate advance after another until the annual rate for a telephone in that city had reached a prohibitive level except for those to whom the service had a very high value. Market development or loadbuilding did not occur until telephone subscribers were at least roughly classified and measured service also introduced. Obviously, further refinements in such rates have brought about a more complete development of the market for telephone service.

I need not inform this audience that when gas rates were made on the uniform basis of so much per thousand cubic feet whether a few thousand or a million cubic feet were consumed that the market for gas was not fully developed. It is unfortunate that the public generally still believes that utility rates should be simple and uniform. Complexity in utility rates should not exist unless there is a sound economic basis for such rates; but where markets are quite heterogeneous, uniform rates are unsound. Utility consumers should realize that only by having the differentiation in rates can the competition applicable to the different segments of the market be met and a real job of loadbuilding accomplished. It ought to be clear even to the man in the street that proper loadbuilding is the way to secure low unit costs for service. Unfortunately we have had too much emphasis on the *cost* of service in utility rate making. No one will argue that cost is not an important factor in rate making and obviously the total cost of furnishing service must be covered in the revenue received for the total service. But if utility service is to be sold to some types of customers, it is necessary to calculate not the costs *to the utility*, but rather the cost *to the customer for a satisfactory substitute* for the utility service. Concretely, this means that the rate for gas to a certain industry might not pay much beyond the out-of-pocket cost to the gas company, and yet it would be to the best interest of the domestic customers to have the gas company sell gas to such industries for, in the last analysis, it means lower domestic rates than would be possible if such industrial customers are not served. I am not telling this audience anything new when I say that it improves the load factor and reduces the unit costs to stratify or classify the various customers of a public utility so as to secure the fullest possible utilization of the plant and hence the lowest possible unit costs; but I cannot emphasize the fact too strongly that this simple law of marketing is not sufficiently well understood by the public and, in some instances, even by the regulatory commissions. More will be said about the latter point later.

Recently there has been much said about prudent investment as a rate base. The government appears to feel that if the utilities would adopt it as a rate base, there would be little difficulty either in public utility rate making or in realizing a fair return on such a rate base.

It may be well to raise the question whether any rate base, whether it be prudent investment or reproduction value of the plant, can really be used in the actual making of rates. It ought to be clear that neither railroad rates nor street railway rates can be made today so as to yield a fair rate of return on any theory of a rate base. The great difficulty in reasoning from some sort of a rate base to the actual process of rate making is that such

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thinking completely ignores the fact that the market for public utility service cannot be made to respond to legal rules. In other words, a railroad charter or a street railway franchise may be drawn to provide for certain rates, but these rates may not be the actual rates which will need to be charged if these utilities are to secure traffic.

Our mistakes in calculating rate bases and in making utility rates have resulted in part from the fact that we think of such rates as static and yet, the utilities must serve a world that is highly dynamic and in which prices of the very materials the utilities must purchase and the wages they must pay are constantly changing.

In order to test the theory of prudent investment as a rate base, let us assume that during a period of 20 years public utility plants have been expanded on a fairly high price level. Then let us assume that during the next 20 years, prices are on a distinctly lower level. Is it not clear that the utility must ignore the rate base it built during the first 20 years if it is to be able to hold its market? Will not the possibility of a competing plant, or the possible substitutes for the utility service, force the utility to make rates that ignore its high-price rate base, and that recognizes the price at which customers can provide themselves with a satisfactory substitute service? It cannot be too strongly emphasized that regulatory authorities or utility managers cannot make the market for utility service respond to some set formula.

Is it not clear that a large industry that has the choice of making or purchasing power will pay no more to a public utility than it would cost the industry to provide power for itself. Will it do any good for the public utility to inform the industry that the "prudent investment" of the public utility plant was so much and that consequently the utility rates had to be so much. Let us take another example, one that involves the domestic market. Suppose again that prudent investment had been made over a period of 20 years of relatively high prices. And then, let us assume that a city council would find that it could really make a substantial saving by buying central station equipment and making electricity for the city. In such a case, would not the city council be likely to install a municipal plant?

It will be unfortunate if utility investors are given the impression that there is any such thing as a guaranteed return on a given investment even in public utilities. When economic conditions bring about marked changes in price levels, existing equipment installed at high prices cannot possibly be protected against the competition of equipment installed later at strikingly lower prices. Another type of change may come from new inventions which make existing equipment obsolete. In this dynamic world, it is impossible to expect that the utilities can remain static or that any one theory or a rate base can be adopted and thereafter used regardless of important changes in economic conditions.

If the foregoing reasoning about utility markets and the rate base is sound, it means that we must have a marked improvement in our machinery of regulation. There is need for a constructive program concerned with marketing analysis, rate making, and improvement in commission regulation itself.

Analyses of markets should be much more comprehensive and exhaustive in the future than they have been in the past. When these marketing analyses have been made, it will be necessary to have competent men on the staff of our commissions who can understand what the utility is attempting to do. It is not imperative that public utility commissioners themselves understand all phases of such marketing analyses provided there are experts on the staffs of the commissions who do. Marketing is only one side of the coin and rate making is the other. It is not possible to make sound public utility rates unless one knows the economic characteristics of the market to which such rates are supposed to apply.

We are hearing much these days about the need for simplicity and uniformity in utility rates. No one will deny that in the development of rate structures there has come about needless complexity in some utility rate structures; but it is also an undeniable fact that the demand for simplicity and uniformity in utility rates overlooks the fact that utility markets are not homogeneous. Hence such rates are economically unsound when applied to markets that are heterogeneous in character.

Attention has been called to the fact in the earlier part of this discussion that a good load factor is essential to the economical use of plant, and that only through good load factor can low unit costs be secured. We should not attempt, therefore, to apply uniform rates in such a manner that it will prevent the fullest utilization of utility plant. In other words, if we stratify the utility market, that is, if we look at it as divided into a number of segments which are logical from an economic point of view, we must expect that we will have what may be called "tailor-made" rates to apply to all these various segments of the market. The utilities themselves cannot make such rates and apply them without some disinterested group such as a public utility commission giving its sanction to the soundness of such rate structures.

Of course, there is discrimination in such rate making; but the law has never forbidden discrimination in rates. It has always specified that only unjust and unfair discrimination is illegal. It is not difficult to explain to persons thoroughly familiar with utility rate making that it is to the interest of domestic consumers, for example, to have many other groups of customers served at what may appear to be unduly discriminatory rates. But, if such customers can be secured only at such rates, it may be distinctly to the best interest of the domestic consumers themselves to have the utility serve such customers.

With regard to the improvement of regulation in general, it may be said that this is imperative if we are to accomplish what has already been sketched in this discussion. Too many of our utility commissions today are inadequately staffed to do a thoroughly good job in the field of utility marketing and rate making. We must recognize, therefore, that these commissions must be retooled for their new job. It might be more accurate to say that some of them should be tooled, because, as a matter of fact, many of them never have been properly equipped. It is to the best interest of the utilities themselves and their consumers to have on the staffs of these various commissions thoroughly capable men who can look forward to a career in such work, and who can understand a public utility marketing and rate making problem when it is presented to them. It will be hopeless if we continue a system under which governors can arbitrarily remove the commissioners and indirectly influence the entire work of these bodies. The long drawn out depression has shown how important it is that these commissions be adequately financed. The utilities themselves can easily overlook the importance of a proper financing of these administrative bodies.

There has been in recent years much objection on the part of utilities to the so-called assessment method of supporting the commissions; but it would appear that this is the only way to expect continuity in the way of financial support. If a governor or legislature can make severe cuts in the appropriations to these bodies, it is inevitable that commissions will lose some of their most valuable staff members. This, in turn, will mean that instead of able commission regulations, we will have substituted political and curbstone rate making. This is against the best interest of consumers. It would appear that both political parties ought to recognize that there is no such thing as Democratic or Republican rate making or depreciation, and that only by setting up able commissions adequately financed and with sufficient political independence that they can be expected to be objective in their point of view, are we likely to have anything like intelligent approach to utility marketing and rate making.

Where Will Instalment Selling Go From Here?

By J. A. Livingston
Staff Economist
"Business Week"

J. A. LIVINGSTON

THIS depression—or recession as Washington prefers to have it called—was not caused by instalment selling. Economists are pretty well agreed that this is primarily a business within business slump. Early in 1937, industry feared inflation and rising prices. Purchasing agents got out their check books to buy commodities and raw materials. That was in expectation of a sharp demand for goods in the fall of the year. And when that demand did not materialize, "recovery" changed to "recession," and it no longer was a question of how far recovery would go, but when would recovery start in all over again.

This suddent shift in the business temper has had a direct and immediate effect on instalment credit. The Department of Commerce notes that department store collections on instalment accounts were 5.2% lower in December, than in December, 1936. That is readily explained. When debtors lose their jobs, or are laid off, or get wage cuts, their ability to meet their obligations is curtailed —naturally.

Credit men are not particularly scared by the phenomenon. They went through it in 1930, after the 1929 stock market crash. Then, it is true, the decline in industrial activity was not nearly so steep as the recent drop. But it was pretty bad, as you will only too well remember. And when it was all over, sales finance companies which specialized in instalment contracts discovered that the $30 to $60-a-week salaried man and the wage earner were pretty good risks. More, they discovered that buyers were not reckless in making new commitments.

Whereas instalment sales amounted to more than 13% of total sales in 1929, the percentage dropped steadily during 1930, and 1931; and in 1932, instalment sales accounted for less than 5% of total retail sales. So, then, the picture was this: as pay envelopes got thinner, and people lost their jobs, they became reconciled to beer pocketbooks. They ceased buying gas ranges, automobiles, water heaters and fur coats on I. O. U's.

Of course, consumers, themselves, do not deserve entire credit for that depression wave. The hard-headed men who have to pass on credit risks also merit a pat on the back. Credit managers were not carried away—in the enthusiasm of making a sale—and so they put the n.g. stamp on dubious risks. That explains why the losses on instalment contracts have been confined to $1.20 to $1.50 on every $100.

Right now, of course, credit men have their headaches. People are not paying up, and every day the question arises whether to repossess or to be lenient. That's primarily a matter of credit judgment, particularly since in your business, repossessions will be awfully unpleasant. Undoubtedly you will strive to avoid them for a very good reason. Every time a dealer takes back a water heater, a refrigerator, or a gas range, you lose a customer; and if you lose a customer, you lose load. A water heater which leaves home and goes back to the dealer's shelf has seldom been known to consume gas.

Consequently, if a company sells gas appliances directly to consumers, it certainly will hesitate to recapture equipment; and if dealers have taken the credit risks, you are apt to try to get them to "go easy." After all your interest first and nearly always is to increase your cubic footage.

Sales of new equipment early this year are not likely to approach last year's total. Retail sales are already running 5% below 1937 levels, and if history is any guide, instalment sales of merchandise will decline faster than cash sales. So you had better be prepared for fewer installations in 1938. Moreover, it hardly seems wise to try to push sales too hard, even though you are interested in the sale of appliances, indirectly, and the gas load directly.

You can well imagine what will happen to your business if gas equipment has been oversold. Dealers, sooner or later, will be faced with the dilemma of repossessing or letting payments slide. There will, of necessity, be repossessions. And then gas men will be in the unhappy plight of standing by helplessly while part of their business vanishes with the moving truck which carries the equipment from the kitchen to the dealer's warehouse.

Fortunately, there is no imminent danger that repossessions will be large, or that consumers who have instalment contracts outstanding will default rapidly. Precautionary measures were taken in time. Last spring bankers became worried about long terms and short down payments, and warned finance companies that

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24 months to pay on automobiles and 5 years on refrigerators were excessive. They made the point that recovery had advanced pretty far since 1933, and that some time in the future—let us call it "x"—there would be a business relapse.

Sales finance companies, such as Commercial Investment Trust, Commercial Credit, General Motors Acceptance Corp., and a host of others, began to tighten up. At the same time, credit men and trade associations likewise put on pressure. The theory was that we were three years nearer this imaginary point "x" and that it was as good a time as any to be cautious.

The immediate consequence was that terms were shortened and down payments stiffened on automobiles, refrigerators, water heaters, ranges and so forth. Utilities, on the whole, did not take kindly to the development. To them it meant fewer sales; and fewer sales, in turn, meant a less rapid increase in load. But now that's ancient history. Terms did tighten; and a business recession, which even the terms-stiffeners did not anticipate, developed. And the situation today is that instalment credit is much better than it would have been if retrenchment had not taken place last year.

It's very much like the Boston marathon. The smart runner starts off fairly briskly for the first three miles, then takes it easy to catch his second wind. Well, instalment selling right now is in that phase of catching its second wind. For the first six months of 1938, there will be a drop in volume. Whereas the volume of instalment sales in 1937 amounted to about 12.4% of total retail sales, it is probable that for the first half of this year the volume will range between 10 and 12%. Then, if business picks up in the final six months, and people go back to work and payrolls rise, instalment volume likewise will pick up.

Consumers as well as credit men again will have more confidence in the future. Both buyers and sellers will regain faith in next year's pay check, which is, in essence, the foundation of every instalment contract.

One thing is certain. Instalment selling is here to stay. It has an ancient heritage and an economic function. Long before Christ, instalment selling was used as a device to anticipate earnings. Instalment contracts cut in cuneiform characters endure to this day on clay tablets in Mesopotamia. And Crassus, a Roman, got rich selling land on the instalment plan.

But, like everything else, instalment selling can be overdone. As a stimulant to production, it enables the sale of goods before the buyer has accumulated the dollars necessary to make a cash purchase. He mortgages his future income. And in that way, instalment selling enables producers to sell goods in advance of accumulated purchasing power.

There are risks involved—as there are risks in every credit undertaking. If a man loses his job or gets a salary cut, he may be compelled to let payments lapse. That's a hazard which can be estimated, but which can never be foreknown. It is a hazard inherent in every credit transaction. When a bank makes a three months' loan to a manufacturing concern to buy inventories, it runs the risk that sales will fall off, that commodity prices will drop, and that its loan will go sour.

But the experience of 1930 and 1931, when instalment losses were comparatively small, indicates that as a sales stimulant it is not "dangerous black magic." Merchants and finance companies and banks have learned how to handle instalment credit. Moreover, there is no suggestion in the facts we now have at our command, that instalment credit has been misused.

Instalment credit, it is true, has extended to "soft goods," that is, wearing apparel. But department stores and mail order firms have carefully weighed the consequences, and found the business fairly satisfactory. The safety resides primarily in the initial credit checkup. A repossessed pair of pants is not likely to have much resale value in the second hand market. But in durable goods, such as water heaters, refrigerators, ranges and automobiles there are two safeguards: (1) credit checking, (2) and the value of the repossessed article.

If down payments are large enough, and monthly payments stiff enough to insure that at all times the refrigerator, or water heater will have a resale value in excess of the unpaid balance, credit men can feel pretty certain that they are safe. Buyers will not—if they can help it—surrender a convenience—if they can sell it for more than they owe on it.

The important thing to remember at all times is to sell merchandise, not terms; if the merchandise is good, and if the terms are right, then the danger of repossessions and a vanishing gas load will be minimized.

And now, at this point, it would be nice to be able to say, don't worry about instalment credit, it's intrinsically sound, and it won't be carried to excess. But that would be a foolhardy statement. The drive for sales volume, particularly in a year of slow business, is apt to produce carelessness and overenthusiasm. About all that can be said is that so far, despite its expansion and its wider acceptance—there was a time when instalment buying was looked down upon and now the best families do it—instalment credit has not got out of hand.

It's too bad that the statistics on instalment selling are not what they might be. But we do have a fair idea of what is happening, thanks to hard work by the Marketing Research Division of the Department of Commerce. Roughly, it can be estimated that instalment accounts outstanding aggregate around $3,000,000,000; and that the average instalment account outstanding has about 8 months to run.

That would imply two things: first, that consumers are not locked up in a contractual vise, because with any reasonable stability in income, they will be out of debt, on the average, in three-quarters of a year; second, it implies that the amount of debt is not extraordinarily large relative to the total national income, which in 1938, ought to amount to $60,000,000,000 as compared with last year $67,500,000,000.

So then, here is what we find. Most instalment I. O. Uers will be free and clear in about eight months, which means that in the latter half of the year, they'll be back in the market with their full purchasing power. Also, we find that instalment debt is only about a 5% mortgage on the prospective earning power of the country this year. That would warrant, it would seem a tentative conclusion that the country is far from being sold out to the future.

Consider what happened last year. Instalment sales amounted to only $5,000,000,000 (out of total retail sales of $40,000,000,000). That 12% proportion does not seem topheavy, even though it is true that instalment credit has an inflationary impact on sales, just as loans on securities tend to have an inflationary impact on the stock market. But over a period of years, instalment credit has fluctuated closely with retail sales. It's gone up faster than retail volume, when retail volume has been on the rise; and it's gone down faster when retail sales have been on the decline.

(Concluded on page 62)

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New England Gas Association

12th Annual Business Conference

Report of Meeting—Papers and Abstracts Sales Contests and Best Paper Awards

THE New England Gas Association held its Twelfth Annual Business Conference at the Hotel Statler in Boston on February 24th and 25th. A registered attendance of 485, twenty per cent higher than last year and the largest in eight years, gives some indication of the interest taken in this Association by its members and of the exceptional quality of its programs.

Located in a section of the country where gas companies are faced with particularly difficult competitive problems the New England Gas Association has done an outstanding job in disseminating information and promoting interchange of ideas not only at its annual meeting but also at its many sectional meetings. Such enterprises as its sales training program show the courage and ability behind what many would regard as something too ambitious for an organization of its size. In fact it has been suggested that some of its smaller members owe to this Association the difference between success and failure.

Under such circumstances it is not surprising that the secretary was able to report that "the year has witnessed a continued increase in the Association membership. The membership figures follow: 77 gas companies; 89 manufacturer companies; 6 associate companies; 4 holding companies; 12 non-residents, and 706 individuals. The gas company membership represents more than 99% of the New England meters."

In this report, and the papers and abstracts printed here we bring to our readers many of the high lights of this most instructive and interesting meeting. Available space does not permit the inclusion of all the papers in this issue of the Journal.—Ed.

In accordance with precedent, the conference opened with presentation of Sales Contest Awards by Mr. John A. Weiser, Vice-President of the Newport Gas Light Company. The "Best Paper Awards" were also presented during the first morning session.

Ten Points In Ten Minutes

By

Alexander Forward

Managing Director American Gas Association

IT is a difficult task to propound ten points about the gas industry without anticipating what may be said by your speakers who are individually prepared to discuss them separately, with more skill and at greater length than I can command. But here goes just side remarks:

(1) The passage by Congress of the Housing Bill of 1938 is a happy circumstance for the gas industry, not only because of the enormous stimulus it has already given to the construction business, but particularly because the widespread publicity and interest it has aroused chime in exactly with the American Gas Association's Home Planning Appliance Building program. We could not have asked for a more fortunate coincidence if Congress had been working for us. Like getting money from home.

(2) In all of my years with the Association I have never seen anything like the interest displayed by the sales forces of our companies in the domestic and industrial sales conferences and in the sales contests we are promoting in cooperation with the Association of Gas Appliance and Equipment Manufacturers. When sales people are on their toes like this, something is going to move. In fact, the industry generally is aroused to action.

(3) Our progress in commercial and industrial air conditioning is quite satisfactory and promising, and no doubt the domestic side will follow along.

(4) After twelve years the A.G.A. Laboratories are more firmly established than ever in the confidence of the industry and in the appreciation of what their work means in the sales of appliances and the welfare of the industry.

(5) While Social Security is now on an erroneous basis of heavy taxes to build up a mythical surplus, which will undoubtedly be corrected, the realist knows that old age benefits, unemployment insurance and assistance to the blind and to mothers are here to stay. Most of the other important nations preceded us in these matters and no country has abandoned its program.

(6) The reason given by competitors for their projected national advertising is that something had to be done to offset the national advertising and promotional activities of the gas industry.

(7) It is astonishing how after several years the demand for the Mystery Chef cook book and supplements is maintained. Marriage must be as popular as ever or else more women are learning to cook, or both. There have been distributed nearly two million of M.C.'s cook book and now it is necessary to print a new edition.

(8) Our recent conferences with representatives of the National Association of Master Plumbers have resulted in reaffirmation on their part of the necessity for cooperative relations between our respective sales forces in the sales and connection of appliances. A tentative form of agreement worked out by the respective committees is now under

GEORGE S. HAWLEY

New England Gas Association Officers and Directors 1938-39

President; George S. Hawley, The Bridgeport Gas Light Company; 1st Vice President, R. J. Rutherford, Worcester Gas Light Company; 2nd Vice President, John A. Weiser, The Newport Gas Light Company; Treasurer, F. D. Cadwallader, Boston Consolidated Gas Company.

Directors: **Immediate Past President, R. L. Fletcher, Providence Gas Company. Directors-at-Large: F. L. Ball, Boston; W. C. Bell, Boston; N. B. Bertolette, Hartford; C. H. Cummings, Boston; E. M. Farnsworth, Boston; F. M. Goodwin, Boston; I. T. Haddock, Cambridge; R. N. Hill, Burlington; W. F. Norton, Nashua; H. R. Sterrett, New Haven; G. W. Stiles, Portland; R. B. Wright, Boston; C. G. Young, Springfield.**

Executive Secretary, Clark Belden.

Division Chairmen

Note: The following men, as next year's Division Chairmen, are Association directors, having just been elected by the members of their respective Divisions:

Gordon G. Howie, Cambridge Gas Light Company, Operating; Cyrus Barnes, New England Power Association, Boston, Sales; R. M. Keeney, The Connecticut Light & Power Company, Hartford, Industrial; A. E. Erickson, Providence Gas Company, Accounting; E. E. Bangs, Industrial Appliance Co. of N. E., Manufacturers.

Group of 1938-39 Officers and Directors The New England Gas Association:

Front row, l. to r.—F. M. Goodwin, G. S. Hawley, R. L. Fletcher, J. A. Weiser, F. D. Cadwallder, F. L. Ball.
Middle row, l. to r.—Clark Belden, Exec. Sec., Robert M. Keeney, N. B. Bertolette, Cyrus Barnes.
Back row, l. to r.—Arthur E. Erickson, Gordon G. Howie, R. B. Wright, C. H. Cummings, W. F. Norton, I. T. Haddock, R. N. Hill.
Those not appearing are: R. J. Rutherford, H. R. Sterrett, W. C. Bell, E. M. Farnsworth, C. G. Young, Edward E. Bangs, G. W. Stiles.

consideration and the result is pretty sure to further cement our friendly relationships with dealer groups.

(9) In almost the words in which I quoted from another last year, while returns from research cannot appear upon the balance sheet, nevertheless research is the best safeguard to the items which do appear on the balance sheet.

(10) It seems scarcely necessary to say once more that taxing authorities, mainly state and local, have found the utilities useful as tax collectors. The theory is that the public eventually pays the taxes though rates, but the taxing authorities are willing to bet their jobs that the public won't find it out.

(11) Look who's here! Did I count the points wrong? The industry has the most efficient, economical and attractive appliances in its history, better than anybody else can offer, and the manufacturers are going to give us a super-range right away.

I have used up all my points in all directions of the compass and the sum of the whole is that the gas business will be a major and basic American industry long after everyone in this room has stopped keeping up the gas fires, in this life anyhow.

Customer Service Trends

By W. H. Weber
The Brooklyn Union Gas Company

The increasing demand for customer service is due in large measure to the modern gas appliance and its acceptance by the customer. I know it sounds paradoxical to claim that an improved, m o d e r n, automatically controlled appliance should cause more service problems than its predecessor, but when all the factors are considered it will be found that this is the situation.

For example, compare the modern range with the old model of the past. This was simple in design, sturdily built and manually operated. There were no pilot lights and very few enamelled parts. The service problem was simple; adjustments could be made easily, breakage was at a minimum and pilot outages were unknown.

As improvements were made, the potential source of service calls increased, and with each improvement the service problem became more difficult.

The other kinds of gas burning appliances are not so varied as to types or number of manufacturers, but each has added its particular burden to the service department in a similar manner.

The customer also looks upon the company as the proper agent to handle all his problems. I doubt whether a housewife years ago would have considered calling in the ice man to repair a leak in the ice box drain, but today, if there is a leak in the water line of an Electrolux the gas company's service department is notified. Similarly, a house heating customer will call for our service if he has troubles with back drafts, whereas he never considered calling in the coal man to correct such a condition when he used a coal furnace.

It is quite possible that some sales policies have helped to create this condition, but I believe it is due more to the close relationship of the gas appliance with the gas company in the mind of the customer. Such a situation naturally will increase the demand for service.

In addition, our customers expect more service because they are accustomed to receiving it from other sources. All business has been training the public in this direction.

As the demand for service increases, the service personnel, equipment and training have to be improved. Whereas the qualifications of the old gas man were a knowledge of pipe fitting, the service men now must be qualified to adjust regulators, controls, thermostats and safety devices, and understand electrical circuits and the rudiments of heating systems. He must be the type who can appreciate that he is the company's representative on the customer's premises and that the company is measured by his work.

Training has to be provided in order to solve the new problems. Schools must be set up and instructors furnished to teach the men the fundamentals of the new appliances.

Naturally, as the demands for service increases there is an increase in the service costs.

Under such circumstances and with no indication of a change of trend in sight, service policies cannot remain unchanged.

The organization of the Service Department is very important. It should be divided into an Office and Field Force.

The Office Force includes the order table personnel, dispatchers and record-keeping personnel. The adoption of a centralized order table is becoming more general because it facilitates the receipt and handling of orders. By being able to communicate quickly with other departments, the order clerk can adjust many complaints immediately, thereby eliminating the need for additional calls for a visit to the customer's premises. There is an increasing tendency to use girls as order clerks because of their adaptability to this kind of work.

The Field Force may be organized so that there will be a specialized group for each appliance, or every man may be trained to service all equipment within a given area. Most companies adopt a middle course by operating refrigeration and house heating groups separately. However, a further compromise is made by training these men to service other appliances also so that they are qualified for any kind of work. They are especially useful for work on premises where there are more than one type of appliance in use; only one man need visit the premises. The greater the number of men so qualified, the greater the flexibility of the department.

There should be a foreman in charge of each group or some portion of it, and a supervisor in charge of several groups. These men should have definite instructions regarding their work, the district covered and the men under them, and they should be held responsible for everything with which they are charged. The granting and observing of responsibility is a vital link in the chain of command because it creates unity and dependability within the groups.

Personnel is another important factor. If sufficient care is exercised when employing new men many troubles can be avoided during the instruction period and later when the man is on the district.

Other factors which may affect the service policies, such as repairs without charge, maintenance agreements and guarantee periods, must be considered in conjunction with policies of competitors, regulations of State and local governing bodies, rate schedules and merchandising policies. The Brooklyn Union Gas Company must, in accordance with its rate schedule, adjust any gas appliance free of charge. Other repairs are made without charge during the guarantee period but after it terminates the customer is required to pay for material used. Some companies charge for labor if the repair or adjustment takes more than a stipulated time.

Through maintenance agreements customers can contact for the necessary replacement of operating parts by the payment of a nominal sum each year. These agreements are tending to increase. They have been employed most successfully in refrigerator servicing. At the end of last year there were 63,618 boxes out of warranty in the district served by The Brooklyn Union Gas Company. Of this number 43,802, or 69%, were covered by maintenance agreements. This percentage has increased from year to year.

If the customer accepts the agreement for refrigerator service it seems logical that he would accept similar agreements for service on other types of appliances. I don't know of any such agreements at present, but many companies are giving them serious study.

A review of the foregoing indicates that customer service trends are toward an increased demand for service and that costs are increasing in meeting these demands, but I believe that by careful study changes can be effected that will reduce unit costs to acceptable figures so that the cost of service can be balanced against the benefits derived in increased sales, satisfied customers and a reduction in the effects of competition.

The Gas Industry Today

By N. C. McGowen

President, American Gas Association
President, United Gas Pipe Line Company
Shreveport, La.

The year 1937 was one of steady and continued improvement for the gas industry in New England. At the end of that year it was rendering service to some 1,343,000 customers, requiring for this purpose an investment in excess of $250,000,000.

Preliminary estimates of the American Gas Association's Statistical Department indicate that total sales of gas in New England during 1937 amounted to 43,314,200,000 cubic feet, an increase of 2.3 per cent over the preceding year.

Of this total, domestic uses, such as cooking, water heating and refrigeration accounted for some 65 per cent. Sales for house heating purposes aggregated around 12 per cent, while the remaining 23 per cent was represented by industrial and commercial uses.

The sale of gas for industrial and commercial purposes has been an outstanding factor in the progress of the industry during 1937. Despite a severe decline in general business and industrial activity during the last quarter of the year, it is estimated that sales of gas for industrial and commercial purposes in New England during 1937 reached a new all-time high of nearly ten billion cubic feet. This represented an increase of more than 8 per cent over the previous peak established during the preceding year 1936, and was nearly 12 per cent above the figures for the great boom year of 1929.

Another outstanding characteristic of the gas industry in New England has been the marked expansion in sales of gas for house heating. In 1929 the total number of gas fired central house heating installations served by New England gas companies amounted to 7,283. By the end of 1937, however, this figure had more than doubled, aggregating 15,600. At the same time gas sales for this purpose rose from around three billion cubic feet in 1929 to more than five and a quarter billion cubic feet in 1937, an increase of more than 70 per cent in house heating business during this period.

Production and Distribution Developments

By John V. Postles

Chairman, Technical Section,
American Gas Association
Assistant to Vice President,
The Philadelphia Gas Works Company

The production and distribution of gas is an engineering business and the problems must be solved by applying the principles of engineering. The production man is rated as being successful (1) in inverse proportion to his costs, and (2) directly as he improves the quality of his product. The distribution man's success bears the same relation to his costs as does the production man's success, but in addition he is rated directly with the quality of service he renders.

Let us take the production engineers first and see what they have done in the immediate past and what they plan to do in the future. Manufactured gas today is made from about the cheapest raw materials obtainable. To further cheapen it, greater returns must be obtained from by-products. The most recent development in this direction at present is by the Portland Gas & Coke Company of Portland, Oregon. Doubtless all of you have read of the by-products they have recovered in their pilot plant.

Through studies by the Rochester Gas & Electric Corporation and the Koppers Company, breeze, long the dregs of a carbonizing plant, has found a use by mixture with coal before carbonization. This mixture improves the structure of the coke, thereby resulting in a lower cost for gas in that low value breeze is converted into high value marketable coke.

The use of heavy oil for carburetting water gas has cheapened production cost by using a less expensive raw material. This is being continually followed up by having oil men speak before various meetings and keep the industry informed of the bargain materials they have for sale that can be used.

We have reason to hope that our old enemy gum will cease to cause us trouble before long. As yet we have no plant remedy that will eliminate gum troubles but as a means of giving good service to the gas customers, filters have been developed for installation at the appliances that prevent the clogging of pilots and needle valves. This subject is being actively studied by the new American Gas Association Committee on Gas Conditioning.

"Fixed Sulphur" is the next thing scheduled to go; and while we have methods that will reduce it, all gas men are looking for a cheap method of totally eliminating sulphur in the plants.

It is possible that in the not too distant future polymerization of hydrocarbon gases, as is now being done by a few oil refineries, will result in a gas that can be used to the financial advantage of some manufactured gas companies.

The locating of leaks has always had an air of mystery about it and only a few days ago a "gas leak snifter" in New York made the news as one who possessed an unusual job. Had the same reporter who secured that "scoop" been familiar with the stethoscopes used by many companies to locate leaks or the magnetic devices in fairly general use for locating buried lines from the surface of the ground, I am sure he would have been even more amazed.

Distribution systems originally were laid with load joints which afforded slight movement due to expansion at every joint. Then came the demand for tighter joints and higher pressures which led to welded mains and mechanical joints, but the book has not yet been written that says specifically just when each should be used. Filled ground, temperature expansion, corrosive soils, and many other factors enter this complicated formula, and the day may come when a pre-inspection of a new main extension will include sampling the soil for analysis before the pipe is ordered, even though mains have been previously laid in the neighborhood.

Financial and Operating Statements as an Aid to Management

By M. J. Coughlin

Secretary, The Hartford Gas Company

The accountant is the historian in the gas industry. He must accumulate all of the facts and figures that pertain to the operations of his particular company. He must be able to present these cold facts to management for their consideration to help in planning for the future.

In the not too recent past, financial statements and operating reports were worked up by short cut methods. True, we had a uniform classification of accounts, but these accounts were used exclusively without any subsidiary expense accounts by which operations could be broken down. Today we need every possible bit of information both financial and statistical which will help management to employ funds and personnel to the greatest possible advantage. Financial and operating reports should be completed as quickly as possible so that operations which are out of line with budget appropriations will show up immediately and economy effected without unnecessary delay.

Previous to two years ago our company's accounting system allowed for accounts prescribed by uniform classification of accounts with no detail of expense accounts or supporting schedules. A very brief report was made for directors which did not include even a detailed balance sheet. At this time there is presented to the operating staff, a report consisting of over thirty pages with as much detailed information regarding operations as can be digested and used. Included in supporting schedules are income from gas sales reported by meter routes with listing of large consumers. Comparison of gas sales with same month last year, last month with increase or decrease shown for quantity users. Customers by rate classification, analysis by class—residential, house heating and so on. Analysis of use per customer, income per customer, and return per M.C.F. by geographical territory. Transfer of customers from higher rate schedules to lower rate schedules with resultant increase or decrease in income. Necessary added customers in higher brackets to offset income lost by transfer. With the spotting of appliance sales and tying in with gas sales analysis, you can determine results of sales efforts. Merchandise sales are reported daily and monthly and an analysis of returns and allowances made to determine reasons therefor. Merchandise sales by classes of appliances and whether sale was made by floor salesman, dealer, plumber, outside salesman or originating from other sources. An analysis of sales by sources of prospects is an interesting study. All this information, while requiring additional detail, is surprisingly helpful and enlightening particularly to the sales manager.

But I do not believe that financial and operating reports should be presented to management only. What about departmental heads?

The staff have operating functions to supervise and should have all possible knowledge of the condition of their company. In delegating authority and placing responsibility there are assumed those fundamental tools consisting of materials and personnel. Supervisors should, at least, have reports and statistics pertaining to departmental operations. How else will efficiency be gauged.

New York World's Fair, 1939

By Hugh Cuthrell

The Brooklyn Union Gas Company

Today every indication points to the conclusion that the Fair will be the largest in attendance, public interest and lasting influence of any exposition ever held anywhere at any time. It will provide a fine setting for our business as gas will be advertised more dramatically and on a much wider scale than at any time in the past. The advantages of gas will be presented in such an attractive manner that a definite impression should be made on a vast number of the 50,000,000 persons expected to visit the Fair next year.

Leaders in the gas industry realized at the outset that the proposed New York World's Fair presented an exceptional opportunity. Its location is to be so strategic, its scope so vast that these men felt at once that an impressive exhibit should be prepared for acquainting millions of people at the Fair with the true story of gas.

It was realized at the same time that the task of organizing, financing and conducting a display large enough and sufficiently dramatic to present this giant industry adequately was one involving a vast amount of work.

Accordingly, Gas Exhibits, Inc., has been duly formed as a non-profit corporation. Its purpose has been to create and stage the finest and most effective exhibit which the industry can devise and produce. The corporation gained the honor of being the first private enterprise to break ground for its building at the World's Fair. This was done on January 18.

Gas Exhibits, Inc., has reserved approximately 100,000 square feet of exhibition space in the Home and Shelter Section of the New York World's Fair. Upon this, it will erect a Gas Industry Building and other display features. In part of the building, an educational exhibit will show, by the most effective means possible, the production, storage, distribution, and use of gas, both manufactured and natural. Epoch-making discoveries and inventions upon which the gas industry has been dependent for scientific development of each phase of the industry will be effectively dramatized. Careful research into each important feature having a scientific significance will be ably portrayed in model or in actual reality.

Plans for the exhibit also call for the erection of an all-gas home. Here will be a model kitchen that will appeal strongly to women and inspire them to improvements at home. A model basement will also be arranged, showing how gas conduces to neatness and permits wide use of basement rooms for play-rooms and for entertainment.

Gas will be the sole illuminant for the structure and even the golden-toned stucco exterior will be floodlighted by gas. Guarding the main entrance court will be four flaming pylons, each 90 feet high, grouped around a 50-foot gas flame which will roar skywards from a huge cube

representing 1,000 cubic feet of gas.

The gas building at the Fair represents an outlay of $750,000 for the building itself, to which must be added the $375,000 which the Consolidated Edison Company and my company have been spending in building new gas mains and equipment for the Fair. The amount of capital expenditure of the gas industry in connection with our project is further extended by the fact that gas exhibitors all over the country already have purchased a million and a quarter dollars of fair bonds, raising the total of gas industry participation in the Fair to more than two and a quarter million dollars.

Naturally large volumes of gas will be required for the Fair. Cooking and water heating for restaurants are expected to be the cause of the greatest load. Gas for dozens of large restaurants capable of serving tens of thousands of people, together with industrial loads for baking, food manufacture and other processes, and gas display flames, will be added to heating loads for buildings during cold weather. This load will approximate that of a fairly large city.

To insure adequate gas service for the New York World's Fair, a distribution system has been set up to handle an hourly demand for gas which is more than 50 per cent greater than that utilized for the Century of Progress Exposition in Chicago during 1933-1934. In this estimate allowance was made for the differences in the heating content of the gas. (Chicago, 800 B.t.u. per cubic foot, and Brooklyn, 537 B.t.u. per cubic foot.)

In my company we have been working for two years on this World's Fair. We have been trying to make gas conspicuous at it. We have thoroughly sold the idea of gas to the World's Fair officials. As a result all the central heating and water heating for the Fair buildings will be done by gas. All the cooking will be done by gas.

At the present time we have installed space heaters and water heaters in 17 buildings now in use as well as ranges and other equipment. We haven't stopped yet. We intend to get even more gas equipment into the World's Fair. As an indication of the success of our efforts thus far let me tell you that the World's Fair used 5 million cubic feet of gas last month. Think what that will increase to when the Fair opens!

While this gas load is very attractive to my company, there is an even more important angle to it. The uses of gas plus the gas exhibit provide the greatest advertising that our industry has ever received. Here is an opportunity from which all of us can benefit.

Focusing National Advertising on Local Markets

By Hugh A. Mitchell

McCann-Erickson, Inc.,
New York Advertising Agency

In spite of the short time it has been going and in spite of the tremendous competition from all sides fighting for attention, your national campaign has begun to show results. Let me give you a high spot summary.

1. We hear from all sides that the morale of the entire industry has been boosted.
2. Here is interesting evidence of genuine reader interest in the national advertising. A survey made by the gas company in Nashville showed that 60% of the company's customers have been attracted by the magazine ads in color and look upon the national campaign as a part of their local company's advertising.
3. Increased sales where a good tie-up advertising job has been done. For example, one gas company reports their tie-in advertising, including dealer tie-in, helped to produce a remarkable sales increase in gas ranges both for the year 1936 and again for the year 1937. Last year's increase was 27% over the previous year.
4. Gas appliance manufacturers inspired by the A.G.A. campaign are using advertising in greater volume today than ever before—even though this total volume is still small.
5. Because they have learned more about this industry and its products, women's magazines have changed their editorial policies—most of them are now giving gas and modern gas appliances a 50-50 break with electricity. This is a most valuable accomplishment since the editorial stand of these magazines has great influence on millions of women.

Here are the things that ought to be done if each individual gas company is to get the most out of this current effort to meet competition:

1. Every individual in the organization should be completely *sold* on the merits of the product that provides his job.
2. Every employee of the industry should be made familiar with the national advertising campaign in which his company is participating—and he should *talk* about it. That would mean 135,000 salesmen—a whole army of salesmen selling gas at every opportunity.
3. Somewhere, in every bit of the company's local advertising should be something that identifies it with the national campaign. For instance, the national slogan, "Gas is your quick, clean, economical servant." Do you believe it? Make it a must in all your advertising.
4. Every dealer in your territory should be made thoroughly aware of the national effort and be enlisted as an ally to help in the big selling job the gas industry has to do.

A Shadow

By J. L. Johnson
Sales Manager, Providence Gas Company

This morning your program schedules "A Shadow," in keeping with the old saying that "coming events cast their shadows before." The particular event, the coming of which is to be foreshadowed this morning, is the debut of the Certified Performance gas range.

The Association of Gas Appliance and Equipment Manufacturers has postponed the date on which the Certified Performance range, *as such*, will be available until about August 1. Note well the language, "Certified Performance range *as such*." In doing so, they have acted on the basis of expert legal advice given by their counsel.

Making it plain that I speak for no committee, no organization, no manufacturer, but for myself only, may I indicate to you the possibility that gas ranges which do conform 100% to the new specifications will not necessarily be delayed until August 1. If I mistake not, at least a limited number of range manufacturers will be in a position to supply equipment, which fully meets the requirements of the specification sheet, within a period of a few weeks. Let me emphatically caution you, however, that, if such ranges are offered you and you see the advantage of immediately marketing these ranges, you should not present them to your customer as Certified Performance ranges. Use the improved specification in your sales presentation, but do not use the trade name or insignia.

These new Certified Performance ranges will all have at least one 12,000 B.t.u. burner. The minimum thermal efficiency of the smaller, or 9,000 B.t.u. burner will be 45%. These improvements will give us a still greater advantage in speed on the cooking top. A definite high standard will be established for the effective broiling area. All ovens will be equipped with automatic lighting. Surface temperatures of the range will be lowered. Customers will enjoy greater economy in oven preheating and greater economy in oven operation and there will be increased speed in oven preheating and in broiler preheating. Since two-way top burners are specified, our industry will offer the only top cooking unit on the market which combines instantaneous heat, unlimited flexibility and fixed point control! In view of the fact that these requirements are not optional, but mandatory, you may be assured that the Certified Performance ranges will meet the advance notices.

What You Get for Your Home Service Dollar

By Jessie McQueen
Home Service Counsellor,
American Gas Association

The subject of budgets is a problem the Home Service Committee has struggled with for years and years,—that is, how to set up a home service budget to make it uniform for at least companies of the same size. So far we have bumped our heads against a stone wall because no two companies budget alike. Here are some plans in companies with more or less the same background,—departments in cities serving closely surrounding territory. For this breakdown we have used just three divisions: first, the payroll; second, general expense, such as stationery and printing, large equipment and mailings; and third, operation cost, which includes food, maid service, laundry, small equipment, transportation, telephone calls for home call work, etc. Home Service Dollar (1) is in a company serving 400,000 meters. There is a varied home service activity in a department of twelve girls, and the yearly cost is 4c a meter. Home Service Dollar (2) is in a company of 25,000 meters serviced by two girls at 15c a meter.

In many companies the home service cost is allocated in different accounts. Sometimes part of it is assigned to advertising and some to customer service. The most frequent account is that of new business. Therefore suppose we take a New Business Dollar and find out how home service fits in. In a dollar breakdown for a company serving 400,000 meters, 14.6% is for new business management salary; 0.7% to the part of the advertising salary assigned to new business; 24% to advertising supplies and expense; 36% to canvass and soliciting; 19% to miscellaneous new business supplies and expense. The home service cost is 7% of the new business dollar. Here again the home service cost is 4c per meter.

In the same breakdown the next new business dollar allows 28% for home service at a cost of 24c per meter.

In still another company three divisions are made in the home service budget. 16.5% of the cost is assigned to new business; 35.5% assigned to distribution as a service on customers' premises; 50% charged to miscellaneous general expense, accounted for as "holding the load." In the part assigned to new business 15% of the new business dollar is for home service and the cost per meter is 5c.

In looking at the three sections of the home service dollar, the payroll division is important and is controlled by local situations. May I call attention to some points that may guide you, and quote a statement by an able gas executive:

> "The total compensation should provide a suitable *standard of living*, be high enough to *attract and keep desirable women*, and be *comparable to what other companies in the locality are paying* for similar or comparable qualifications and work.
>
> "The total compensation should bear a reasonable relationship to the *value to the company* of the results produced."

Automatic Water Heater Sales

By John W. Clark

Chairman of Sub Committee
A.G.A. Water Heating Committee
Commercial Engineer,
The Connecticut Power Company

New England gas companies pioneered the conversion water heater, which has now become an accepted appliance. The much discussed faucet type or sink water heater has been placed in hundreds of New England homes which had never before known any hot water service but the tea kettle.

The resulting increased sale of gas for water heating has been a life saver to the gas industry. It has served to offset the alarming decrease in the amount of gas used for cooking.

Some years ago when wives looked upon housekeeping as a career, when it was considered a disgrace to serve bakeshop cake or pie, when no husband was allowed to go to work without a substantial hot breakfast—in those days we confidently figured that a gas range was good for 2500 cubic feet per month. Today many companies estimate 1800 cubic feet for cooking, and the curve is still headed downhill.

Mr. Herman Russell, past president of the American Gas Association, developed figures from a careful cost analysis, which showed that the addition of an automatic water heater in the home of a customer, who previously had used gas for cooking only, increased the net return on the capital invested to serve that customer from three-tenths of one per cent to 9.5 per cent.

A similar analysis made for a New England gas property with which I am familiar showed a similar effect. The net return increased from 1.75 per cent to 9.2 per cent after the automatic water heater was installed.

How Gas Companies Can Capitalize Home Building

By Howard Myers

Publisher, The Architectural Forum

Now that you gentlemen find yourselves on the threshold of a sustained period of building activity, you logically ask "Whom do we have to sell to make sure that we get our share of the business?" First of all, of course, the public—the ultimate user—because if you do not do that, the people who build houses will not do it for you. On the other hand, you cannot stop there for the simple reason that most of the houses Americans buy are put up on speculation and offered to the public as a complete package. Generally speaking, only the houses in the higher cost brackets are custom built for an individual owner.

There are five basic groups who have a hand in building new houses: the architects who design them, the builders who erect them, the real estate men who supply the land and frequently some of the financing, the dealers who sell the materials and equipment, and the bankers who put up the mortgage money. Let's not get involved in attempting to measure the relative importance of these five factors. It is wiser and safer to assume that each is important and actually there is no rule of thumb for determining on any particular job, whether it be one house or five hundred in a development, who has the final say. The only intelligent assumption is to surround the building dollar, to get as many of these factors on your side as possible.

A New Plan of Load Building

By Hall M. Henry

Assistant to Vice President,
The Utility Management Corporation

This followed quite closely the paper presented by Mr. Henry before the Commercial Section of the A.G.A. Convention, September 27-October 1, 1937, and abstracted in the October 1937 issue of the *Journal*.

In the paper delivered in Boston on February 25, 1938, Mr. Henry summarized his conclusions as follows:

To return our companies to their former earning position will require:

(A)
1. A Retention Program
2. A Recovery Program
3. A Raise Use Program
4. A Replacement Program
   (a) For Protection
   (b) For New Business

(B) It will mean using:

First Year

1 Domestic Salesman to approx. 1400 meters

1 House Heating Salesman to approx. 3000 meters
(Single and two family houses)

1 Customer Representative to every 3000 customers
(Home Service, Home Economist)

Slightly increase for second and third years.

(C) Modification in House Heating Rates to give an average of 50c/MCF for companies north of Mason and Dixon Line.

(D) An annual Gross New Business Expense for the Four "R" Plan of:

Approximately $4.20/Dom. customer/yr. 1st Yr.

Approximately $5.75/Dom. customer/yr. 2nd Yr.

Approximately $6.51/Dom. customer/yr. 3rd Yr.

(E) A net New Business Expense of:

Approximately $1.09/Dom. customer/yr. 1st Yr.

Approximately $1.62/Dom. customer/yr. 2nd Yr.

Approximately $1.71/Dom. customer/yr. 3rd Yr.

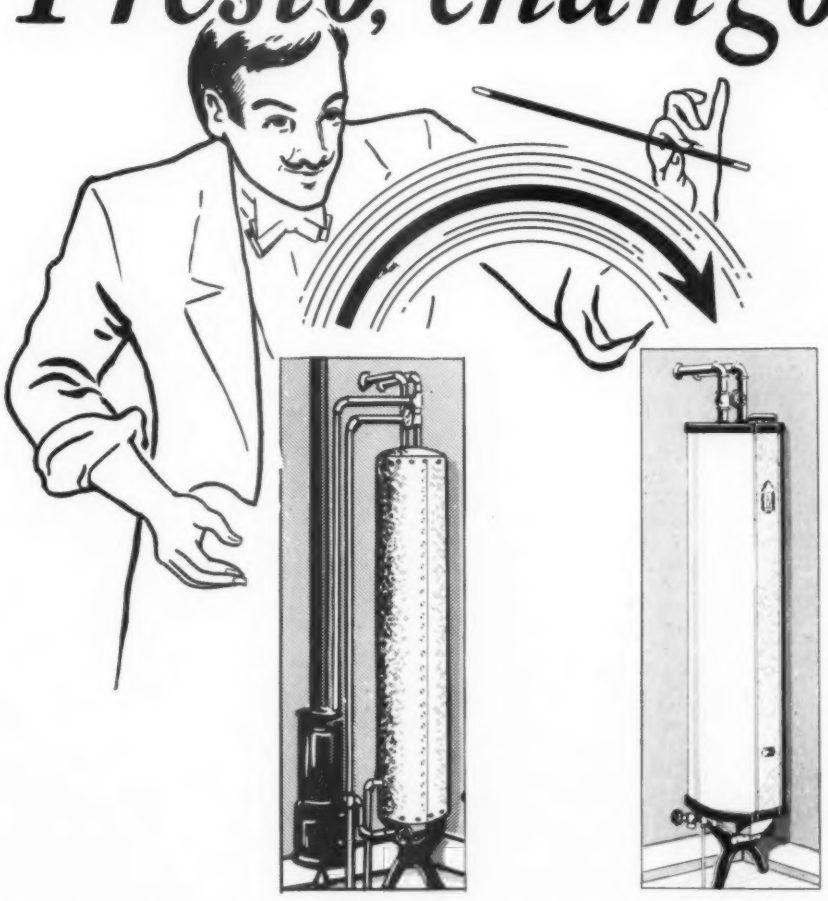
For which we receive

Net Revenue Increases per Dom. Customer of:	Net Expense per Dom. Cust.
1st yr. $0.63/Business	held vs. $1.09
2nd yr. $2.62/Business	held vs. $1.62
3rd yr. $4.96/Business	held vs. $1.71
4th yr., ea. yr. thereafter	$6.68 vs.

We urge a study be made of each company to see to what extent a program of this type can be executed.

The future destiny of our Gas Companies rests on what action we take and on how soon we take it.

Presto, chango!



Just Like That—MIRRO-SHELL'S New Method Of Indirect Heating By Reflection Changes A PART TIME Gas User Into A FULL TIME Automatic Water Heating Customer.

MIRRO-SHELL

Single Unit Combining Complete Heating Element, Thermostat and Insulation At A Low First Cost. Attractive Ivory And Green Morocco Finish Upon 24 Gauge Steel Jacket. No Liming, Sediment Or Circulating Trouble With Mirro-Shell—Also No Condensation Within The Heater. Quickly Installed By One Man.

By Assembling Mirro-Shell Upon New Tanks Efficient And Fine Appearing Complete Water Heaters Can Be Had For An Attractive Price.

Made With Inputs From 4,500 To 10,000 B.T.U. Per Hour For 30 And 40 Gallon Tanks.

Put Mirro-Shell To Work Building Gas Load For Your Company.

FOR DETAILS WRITE

HANDLEY-BROWN HEATER CO.

JACKSON, MICHIGAN

Industry's Biggest Job

By James P. Selvage
Director of Public Relations,
National Association of Manufacturers

Today, for the second time within a decade we find our nation imperiled by the cry of men and women for jobs. It is at such times that business is most vulnerable to attack by those who would overthrow the system under which business operates. It is absolutely essential, therefore, that business go directly to the people with its story that there may be understanding rather than abuses. It is necessary that the public be constantly informed of the various problems confronting business if we are to bring about an understanding in the public mind of the proper relationship of government and business under the incentive, or profit system. Those connected with industry must come out of their shells, and tell industry's story to everyone they meet.

Because anti-industry propaganda seeks to magnify every case of abuse and make the public believe that questionable practices are typical of the entire system, it is the obligation of every industrial enterprise to survey its business practices, to analyze points of weakness and strength, to demonstrate its capacity for change where necessary, and to adopt and maintain high ethical standards in all its operations.

Such behavior will go far toward halting the unceasing attempts to depict all business as blackguards and scoundrels. But there is direct, positive action also to be taken.

Industrial truths need to be carried to the people as never before in our history. For there are years of neglect to be overcome. Years during which the enemy from within was not idle for a moment in peddling his wares.

Business has been primarily interested in advertising and publicity as a means of selling goods or increasing the distribution of merchandise, which is, of course, fundamental in our business system. But, fortunately, in recent years, you have become cognizant of the fact that the mere selling of merchandise is not enough.

We must tell and retell the story of industry in every walk of life until there is not a person left who believes that you can throttle private enterprise, curtail production, and surround business with a maze of pitfalls, and then expect it to produce most wealth so that there may constantly be more for division among all our people.

What Research Is Doing in Gas Utilization

By R. M. Conner
Director
American Gas Association Testing Laboratories

An important product of the gas range study was the development of a so-called low temperature oven burner now commonly and successfully employed. For the first time our industry has been provided on an extensive scale with ranges equipped with thermostatically controlled ovens that will maintain oven cooking temperatures as low as 225° F. The outstanding result of the work on insulation was the important influence on oven performance found to be exerted by metal to metal contact and the beneficial effects in minimizing heat losses from oven walls and hot spots on exterior surfaces, by the elimination of such contacts. Probably the most important practical use of this work was to show that more improvements in insulating effect could be gained by minimizing these metal to metal contacts and by providing better continuity of insulation, than by merely increasing its thickness. This finding has already been applied effectively and without materially increasing construction costs. Careful study of gas range broiler performance developed new data on the relationship between broiler temperatures as measured by pyrometers and the quality of broiled foods. Investigations were also completed showing the effect of radiant ceramic and metallic materials on broiler temperatures. For example, on one test assembly the time required to reach an average broiler temperature of 500° F. was reduced from almost 20 to 8 minutes by use of a special metallic radiant material. On range top burner sections, basic studies demonstrated practical means by which thermal efficiencies on many contemporary models could be increased by as much as 27 per cent.

The Refrigeration Outlook

By H. R. Sterrett
Chairman, A.G.A. Refrigeration Committee
President, New Haven Gas Light Company

In ten short years, more than one million Servel Electrolux gas refrigerators have been sold. These refrigerators have increased our annual domestic gas load to the extent of about 19,000,000,000 cubic feet. Certainly here is a grand job and one to be well proud of.

If one million gas refrigerators could be sold in the ten years through which we have just passed, depression years that included much pioneering and development, surely there is no good reason why this record can not be tripled in the next ten years and 57 to 60,000,000,000 welcome cubic feet of gas added to the refrigeration load.

President's Address

(Continued from page 12)

land gas industry. I am optimistic but I do not believe in going forward with blind faith. After all, the law of nature is more powerful than the law of man. If we have a good product, good appliances and good service, which we have—if we tell our customers that we have these things—then our opportunity is inevitably our salvation. If we here in New England face our problems, not with the spirit of right but with the spirit of fight, our hundred-year-old industry will continue its progress. We have faced harder problems in the past and successfully met them.

Featuring the "TURRET" TOP

On Super DeLuxe Models
A gleaming top surface of porcelain enamel
Ranges fit back against the wall.
Connections Made from Front.
These features are packed with SALABILITY-PLUS!

- "Simmer-Speed" Burners
- "Giant Simmer-Speed" Burners
- "Super-Speed Low Temperature" Oven
- Super Insulation
- "Astogril" Roll Broiler
- "Lifetime" Cooking Chart
- "Thermal Eye" Oven Control and many others.

ROPER

GAS RANGES for 1938

With the introduction of these handsome models for 1938, ROPER paves the way for new highs in Gas Range sales. Already dealers are reporting an unusual interest in the NEW ROPER features. The "Turret" Top has proven especially popular. "Sparkling with Individuality," these ranges mark a new era in gas range Styling and Performance.

GEO. D. ROPER CORPORATION

GENERAL SALES OFFICE AND PLANT: ROCKFORD, ILL.

WAREHOUSES:

San Francisco Dallas Chicago Atlanta Los Angeles Kansas City
Newark Boston Washington Cleveland Philadelphia Roanoke

USE ROPER SALES PROMOTION PLANS

ROPER RANGES ARE IDEAL FOR USE WITH ANY TYPE OF GAS, INCLUDING BOTTLED GAS

The Sales Contest Awards

By J. A. Weiser
Vice President, The Newport Gas Light Co.

There were 62 entrants in the Sales Contest this year, consisting of 50 companies and 12 districts. This was the largest participation since the contest started, there having been 50 entrants last year and 45 the year before.

The outstanding winner this year is the Connecticut Light & Power Company which won 7 awards.

A new feature was the award for the largest number of faucet-type automatic water heaters sold per 100 domestic meters. This contest was not divided into classes but included all companies regardless of size. Thirty entrants competed for this award.

The following companies achieved the best over-all New England record for the following appliances:

(a) Ranges—A tie between Greenwich in Class D and Ware in Class E, both companies having a record of 8.26 units sold per 100 domestic meters;

(b) Automatic Water Heaters (thermostatically controlled)—Greenwich in Class D with a record of 6.51 units sold per 100 domestic meters;

(c) Refrigerators—Ware in Class E with a record of 4.72 units sold per 100 domestic meters;

(d) Kitchen Heating—Winsted District of the Connecticut Light & Power Company in Class E with a record of 3.15 units sold per 100 domestic meters;

(e) Space Heating—Nantucket in Class E with a record of 1.55 units sold per 100 domestic meters;

(f) Automatic Water Heaters (faucet type)—Fall River with a record of 3.95 units sold per 100 domestic meters.

Winners of Class A Awards

The Hartford Gas Company and **Lowell Gas Light Company** (tied) — Largest Number of Range Sales.

The Connecticut Light & Power Company—Largest Number of Automatic Water Heater Sales (thermostatically controlled). Largest Number of Kitchen Heating Installations.

New Haven Gas Light Company—Largest Number of Refrigerator Sales.

Blackstone Valley Gas & Electric Company—Largest Number of Space Heating Installations.

Winners of Class B Awards

Portland Gas Light Company—Largest Number of Range Sales. Largest Number of Automatic Water Heater Sales (thermostatically controlled). Largest Number of Refrigerator Sales.

Meriden District, the Connecticut Light & Power Company: Largest Number of Kitchen Heating Installations.

Pittsfield Coal Gas Company—Largest Number of Space Heating Installations.

Winners of Class C Awards

The Newport Gas Light Company—Largest Number of Range Sales. Largest Number of Automatic Water Heater Sales (thermostatically controlled). Largest Number of Refrigerator Sales.

Bristol District, the Connecticut Light & Power Company—Largest Number of Kitchen Heating Installations. Largest Number of Space Heating Installations.

Winners of Class D Awards

The Greenwich Gas Company—Largest Number of Range Sales. Largest Number of Automatic Water Heater Sales (thermostatically controlled).

Gloucester Gas Light Company—Largest Number of Refrigerator Sales.

Danbury and Bethel Gas & Electric Light Company—Largest Number of Kitchen Heating Installations.

Northern District, the Connecticut Light & Power Company—Largest Number of Space Heating Installations.

Winners of Class E Awards

Ware Gas Company—Largest Number of Range Sales. Largest Number of Refrigerator Sales.

Nantucket Gas and Electric Company—Largest Number of Automatic Water Heater Sales (thermostatically controlled). Largest Number of Space Heating Installations.

Winsted District, the Connecticut Light & Power Company—Largest Number of Kitchen Heating Installations.

Winner of Special Award

Fall River Gas Works Company—Largest Number of Automatic Water Heater Sales (faucet type).

Best Paper Awards

By J. A. Weiser
Vice President, The Newport Gas Light Co.

The following awards are made for those papers presented by an employee of a member company during the past year which were judged by the directors of each Division to be the most valuable and the second most valuable to the New England gas industry.

I am sure that our member companies are indebted to the following men for the help which they have rendered in preparing and presenting these papers:

OPERATING DIVISION

Most Valuable

"The Operation and Design of Diaphragm Meters" by Allen D. MacLean, Pittsburgh Equitable Meter Company.

Second Most Valuable

"Bunker Oil for Water Gas Enrichment" by F. G. Cunningham, Lynn Gas & Electric Co.

SALES DIVISION

Most Valuable

"How To Sell Kitchen Heating" by John Hood, the Connecticut Light & Power Company.

Second Most Valuable

"Why the Gas Company Should Promote Kitchen Heating" by John J. Quinn, Boston Consolidated Gas Company.

INDUSTRIAL DIVISION

Most Valuable

"Let's Get the Small Industrial Business" by W. Wirt Young, Charles A. Hones, Inc.

Second Most Valuable

"How Unit Heater Business Was Obtained" by Joseph Shay, Old Colony Gas Company.

ACCOUNTING DIVISION

Most Valuable

"Utility Store Keeping" by R. J. Daniels, New England Power Association.

Second Most Valuable

"Auditing—What Is It?" by H. C. Moore, Jr., New England Gas & Electric Association.

Honorable Mention

Because of the excellence of several papers which did not win awards, they are to receive honorable mention, even though no engrossed certificates are presented to their authors.

The *Operating Division* directors wish to give honorable mention as follows:

(1) To Herbert C. Jones, New England Power Association, for presenting the paper entitled "Holder Heating With Gas."

(2) To J. W. Penney, Boston Consolidated Gas Company, for presenting the paper entitled "Protecting Steel Purifier Boxes Against Internal Corrosion."

The *Industrial Division* directors wish to give honorable mention as follows:

(1) To Charles H. O'Donnell, Boston Consolidated Gas Company, for presenting the paper entitled "Planning Gas Heat in New Homes."

TITAN WATER HEATER CONTROLS

AGA Approved TITAN Temperature and Pressure Relief Valve

This device is installed on the hot water outlet in the tank directly in the flow of water. Action, as a result, is unfailing and positive, there being no dead pockets to prevent proper functioning of relief valve.

Pressure relief is obtained through a spring-loaded valve which opens when the pressure reaches a predetermined point. Should the water become overheated to 200° F, a fusible disc melts and lets the water escape thereby preventing a further increase in temperature.

The Titan Relief Valve serves as a coupling connected in the line thereby eliminating the necessity and expense of a tee fitting. To replace fusible disc, it is not necessary to disassemble valves or piping in any way.

Designed for application to storage or range boilers. Prevents corrosion, scalding and explosion.

Catalog and full information upon request.

The Titan Valve & Manufacturing Company

Thermostats • Safety Pilots • Relief Valves • Safetystats
9913 Elk Avenue Cleveland, Ohio

BARBER BURNERS

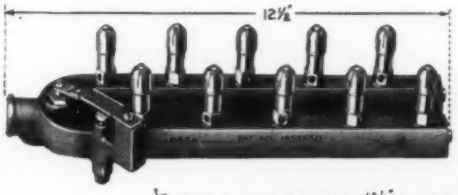
For Gas Appliances

Offer You 3 Things That Count

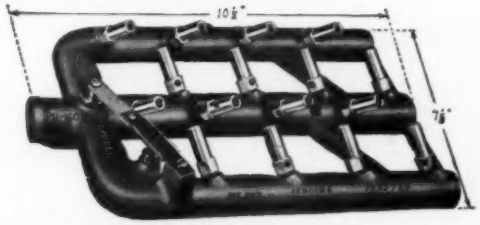
1. **Better Principles of Design**
Including the unique Barber Jet—time-tested by 20 years use. Flame temperature of 2000°F. on atmospheric pressure. Perfect combustion on every type of gas, including Butane.

2. **Practical Laboratory Facilities**
For building and testing burner units correctly adapted to your requirements.

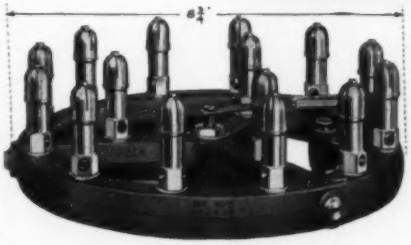
3. **Policy of Real Cooperation with Appliance Manufacturers—**
Every problem is a special problem.



No. C.U.-90 Burner With Safety Pilot

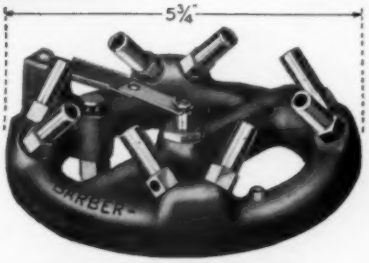


No. P.U.-160 Burner



No. C.P.150 Barber Burner

No. S.P.-15 Burner



• We are Gas Burner Specialists and offer you the facilities of our Engineering Department and Laboratory on your Gas Burner Problems

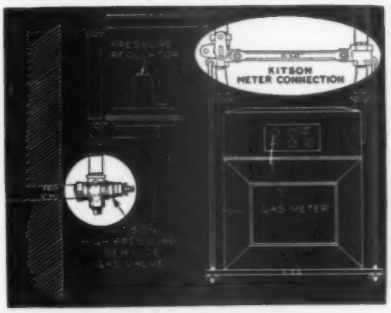
THE BARBER GAS BURNER CO.
3704 Superior Ave. Cleveland, Ohio
Address Michigan Inquiries to
The Barber Gas Burner Co. of Michigan
4475 Cass Ave., Detroit, Michigan

BARBER *Automatic* JET GAS BURNERS

• *for Warm Air Furnaces, Steam and Hot Water Boilers* •

And Numerous Other Heating Appliances

Two



FOR STRICTEST REQUIREMENTS....

KITSON HIGH PRESSURE SERVICE GAS VALVE

This valve is capable of being used on gas pressures up to 125 pounds and it is attached to the service where it enters the basement from the street.

Provision is made in the end of the stem and also in the plug for a wire and seal. Thus it eliminates tampering with the valve after it is set.

It is: Easy to align with service and regulator lines thereby reducing service line breaks; Gas tight under all pressures; Easy to turn on or off—never binds; Self-cleaning—cannot clog; Low in installation and maintenance cost. Sizes made—¾" x ¾", 1 x 1", 1¼ x ¾", 1¼ x 1", 2 x 2".

G-450

KITSON METER CONNECTION

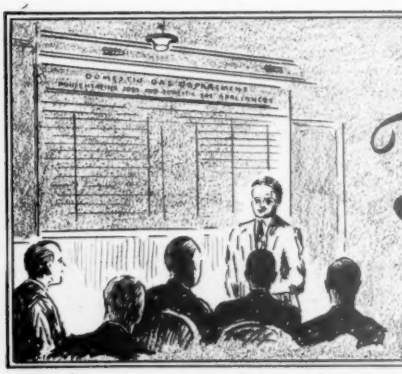
This Meter Connection has Cast Iron Bar and Built-in Iron Body, Lockwing Stop Cock and Brass Plug. Well designed, carefully made.

Details and prices of these products, upon request.

KITSON COMPANY
2409-15 Westmoreland St. Philadelphia, Pa.

Kitson Safety Devices (Lovekin Patents) for Domestic Water Heaters	Quality Brass Goods for Gas, Water and All Plumbing Uses

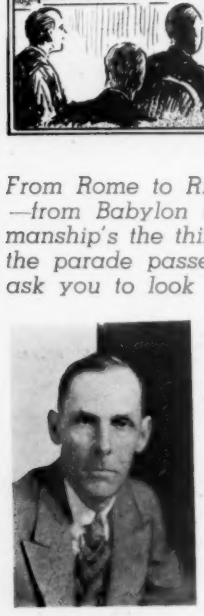
ESTABLISHED 1897



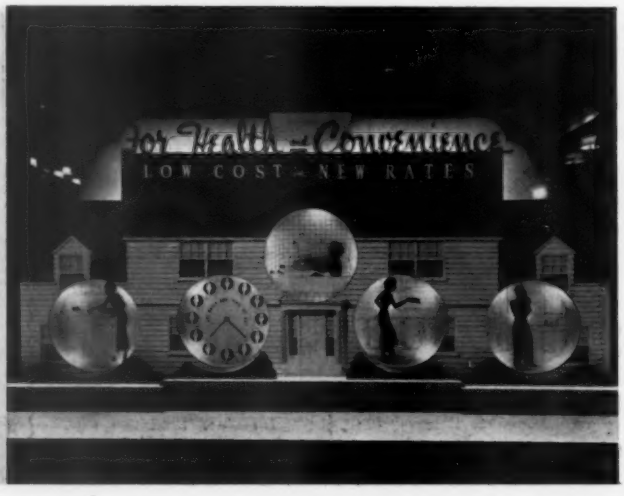
Timely Sales Chats

By William H. Matlack

*From Rome to Ringling and Roxy —from Babylon to Barnum showmanship's the thing in selling. As the parade passes this month we ask you to look at the showmanship in the following exhibits from hither and yon. Being a small town boy we love a parade, to see swing and color in selling and in window displays such as that reproduced of a current creation by Cooperative displays, Inc. for the Cincinnati Gas and Electric Company to sell the idea of Hot Water Service in the home. Boy! we bet that stopped them for it certainly dramatizes the need of Hot Water in the home. To our way of thinking that's the BIG IDEA—sell hot water service and folks will buy water heaters * * * This out-burst brings to mind a new gas water heater sales plan just released by M. M. Scott, creator of the "Furmite" and the manner in which this household pest may be eradicated by Ruuds. This newest plan of Mr. Scott's is built around a boy named "Mr. Penny" and "penny pays the bill" through new economies that hot water service brings to the home. It also is designed to give the fair-haired boys of the sales force a flair of competition. Address Pittsburgh if you're interested * * * Employee cooperation in merchandise sales is a potent force once it is organized. One instance of where such cooperation is going over in good style is in the U.G.I. companies. According to the "U.G.I. Circle" for February at Harrisburg one hundred and seventy-five employees turned in 2612 prospects during 1937 of which nine hundred and twenty-two were developed into sales which included 371 gas ranges, 255 automatic gas water heaters, 275 gas refrig-*



The Outdoor Sales Staff at Work—"Dat Salesman sho' could talk"—*Gas World, London.*



erators, 2 house heating jobs and the sale of 10 hotel appliances. At Reading, employee cooperation resulted in the sale of 150 gas ranges, 152 automatic gas water heaters, 69 gas refrigerators and 14 appliances for industrial and commercial uses. One employee, Harvey Shuman of the distribution department turned in the names of 30 prospects who in turn purchased 2 gas ranges, 25 automatic gas water heaters, 3 gas refrigerators and 6 miscellaneous appliances. We say he should be awarded a sales palm.

* * * Last month we began to color our page with a cartoon apropos to the use of some GAS appliance. We do not lay any claims to **first** and it's a good thing we do not for our mail brings us a clipping of a cartoon used in "Gas World" London from which we would say that the British have their ideas on the value of sales cartoons too, or do they? What's your opinion? * * *

Speaking of advertising and cartoons we see the boys in the gas ad-foundries are going to have an opportunity to win a few extra dimes for their efforts—The appliance and equipment boys are offering prizes for the best advertisements including, newspaper, direct mail, window display, posters, etc.,

COLD WATER AGAIN
TIME WAS-
WHEN MONDAY'S WASHTIME ROLLED AROUND- THERE WAS NO HOT WATER TO BE FOUND
AND
WHO WOULDN'T BE UNHAPPY WITH COLD WATER IN THE TUB AND A HEAP OF DIRTY THINGS AWAITING THERE TO SCRUB
BUT NOW-
A GREAT NEW CHANGE HAS COME TO PASS- THERE'S PLENTY OF HOT WATER HEATED AUTOMATICALLY BY GAS
More families than ever before are taking advantage of our annual sale of automatic storage gas water heaters. This is your opportunity to save $14.00 on a 29-gallon average family size heater. Further savings are found in the low cost of its operation.
The Gas Company
GAS DOESN'T COST IT PAYS

which tie-in with the A.G.A. national campaign. If you have not received an entry blank and the rules address the Association of Gas Appliance and Equipment Manufacturers, 60 East 42nd St., New York.

For your scrap book of advertisements we reproduce this month a couple of timely ones; that of the Laclede Gas Light Company, St. Louis, featuring the GAS clothes dryer and that of the Ohio Fuel Gas Company, Columbus, featuring the need for gas hot water service in connection with the home laundry.

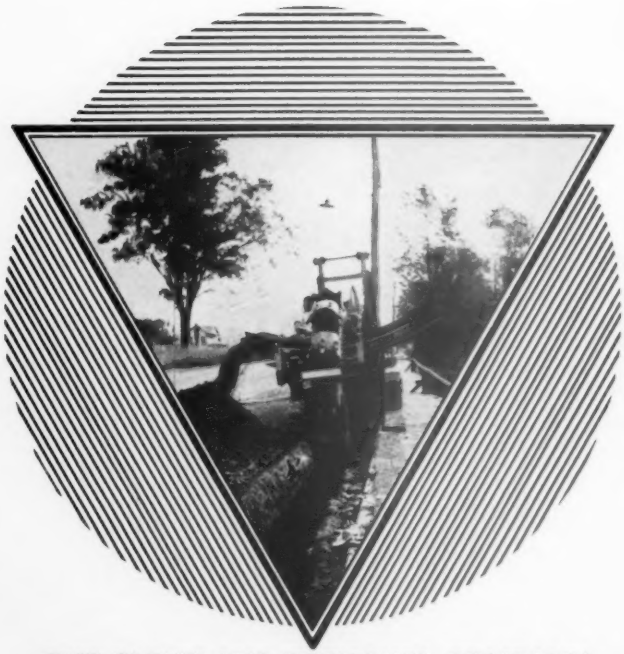
"Stars On Parade" is the Big Book for spring 1938 being distributed to dealers by Magic Chef folks in which a suggested program is offered together with illustrations of a new line of ranges which will be ready for early spring delivery—they are an innovation as are most of our old favorites which have been all dolled up to join the Spring parade of 1938.

One of the newest food kitchens that we have heard about is that of the Pevely Dairy Company, St. Louis. The kitchen is called "Prudence Pevely's Pantry" and is used to conduct cooking schools and in other ways to promote the use of Pevely products. The pantry has been advertised in the newspapers and over the radio.

The model kitchen is in charge of Prudence Pevely and the cooking is done as you may surmise with GAS.

Banish BASEMENT DRAPING OF DRIPPING FAMILY WASH
"It's such a messy job to hang up clothes in the basement..."
Dry Your Clothes the Cleaner, Faster Way With a
GAS HEATED CLOTHES DRYER
Now You Can Buy a Gas Heated Clothes Dryer for as little as
$2.60
per month
The LACLEDE GAS LIGHT CO.
CEntral 3800 . . . OLIVE at ELEVENTH

In the Pevely Kitchen, curtains and walls are coral. Cooking utensils are delphinium blue. The built-in cabinets are white trimmed in blue with tops and splashers of black linoleum. The Garland Range and the refrigerator are white with black trim.



THE CLEVELAND TRENCHER COMPANY
"Pioneer of the Small Trencher"
20100 St. Clair Ave. Cleveland, Ohio

The BABY DIGGER

Digs the Trench Where You Want to Lay the Pipe . . . .

Here's equipment that fits the job; the small compact trencher that gives you dependable performance that's full sized in every respect.

Easy to move to the job; easy to move around the job. Backed by trouble-free construction of unrivaled mechanical excellence, the Baby Digger further improved, is the logical answer to Gas Company trench requirements. Available in a full range of digging widths to fit your work.

The CLEVELAND BABY DIGGER Model 95

SUPERIOR

Diaphragms
Provers
Repairs
Service Cleaners
Gas Meters

SUPERIOR METER CO.
Brooklyn, N. Y.
167-41st Street

News of the Industry

Pennsylvania Gas Association

Midwinter Sales Conference

The annual mid-winter sales conference of the Pennsylvania Gas Association held at the Benjamin Franklin Hotel on February 10 under the auspices of the New Business Committee attracted three hundred representatives of the gas utilities, dealers and manufacturer representative. A. M. Wiley, Pennsylvania Gas and Electric Company, York, Pa., presided as chairman of the state committee. The program was devoted to gas appliance merchandising, sales and promotion and in addition to the speakers scheduled was participated in by a dozen other speakers from the floor.

Howard S. Christman, State President, welcomed the delegates in a brief address and stated that the national campaign of the industry was to make the United States gas conscious. He said he was most optimistic in his outlook for 1938 and that the sales representatives were ready and eager to do their share in making the year one of the best in the history of the industry.

J. F. Quinlan, Director, Home Appliance Planning Bureau, A.G.A. in his talk on "Winning the Home Market" told of the national New Home plan and indicated how this program could be promoted best and most successfully locally. Orr E. Crites, Eastern Sales Manager, Hurley Machine Company, Newark, N. J. discussed "Psychology of Selling" in an interesting and informative paper.

One of the features of the session was a symposium on "Water Heating," participated in by Felix P. Gross, John Wood Manufacturing Company, Conshohocken, Pa.; on "Oil Water Heater Competition"; A. G. Blake, Ruud Mfg. Co., Pittsburgh, on "Conversion Type Water Heaters"; R. C. Bryce, Philadelphia Electric Company, on "Automatic Water Heater Rentals vs. Sales" and H. D. Lehman, the Philadelphia Gas Works Company, on "Value of Regular A.W.H. Inspection."

Harry Boyd Brown, national merchandise manager, Philco Radio & Television Corp. who was the speaker at the luncheon, was introduced by George E. Whitwell, vice-president in charge of sales, Philadelphia Electric Company. Mr. Brown, who has a national reputation as a dynamic speaker, had for his subject "Merchandising Appliances in Today's Markets" and said in part:

The business which is going ahead fastest today and will continue to go ahead most rapidly in the future—is the business with a sales and distribution structure, organized for fast, flexible, aggressive, concentrated selling—not the sluggish, uninspired routine of order taking, but keyed to a highly specialized, intensive, continuous selling power.

In other words, a merchandising and distributing organization with flexibility, adaptability, adjustability — capable of sharp, quick timing, and by that I mean doing exactly the right thing at the right time, and quickly. Nothing less will fit into the tempo of this fast moving, tricky, uncertain age of rapid change in which we are living today.

Looking ahead and planning ahead today in business is a real problem. It takes a wizard today to look and plan twelve months ahead with any degree of certainty and accuracy. The long, steady haul seems to have become pretty much obsolete, and business is beginning to consist of a never ending series of eight or ten month spurts.

We are dealing today with the most changeable, fickle, sophisticated, well posted, aggressive and self assured buying public in all commercial history. It accepts the new and discards the old, almost overnight. New inventions, new developments, new products get instant acceptance, provided, of course, they represent obvious utility and progress.

Recognizing on time public drifts, tendencies, changes in habits, desires, purchasing power is highly essential in business and sales management **plus** having the necessary flexibility and mobility to change with the trend. Being always ready with that something new —a different slant—a different angle—improved product and the facilities to give it quick coverage and distribution.

Materials today cannot be held in stock for long—merchandise cannot be carried on the shelves. Movement must be rapid—not only for turnover and for profit but to avoid obsolescence. Advertising and merchandising must and are adjusting themselves to this new speed in industry—moving merchandise surer and swifter.

Advertising slogans and advertising themes have a short life today. Like popular songs, books, plays and styles, they rapidly reach their peak of public appeal and popularity, then begin to fade. They become stale, tiresome, obsolete. Advertising today must have color—human interest and, above all, change. New themes—new slogans, new appeals—new ideas—always provided they are sound, logical, obviously true and meritorious.

Not so long ago, big advertisers were content to wrap up their advertising in a neat bundle at the start of the season or year, decide what media were to be used, and shoot out a whole season's campaign for better or for worse.

Nowadays, the basic theme may be settled well in advance—and undoubtedly should be, but variations on that theme are apt to be interpolated overnight as conditions change. The newspapers get instructions to destroy the mats they received last Wednesday and insert a new advertisement now on its way by air mail or express.

That's why newspapers fit so well into the speed and flexibility of modern merchandising. If you have advertising news to break, you can break it in the newspapers just as swiftly as the newspaper gives you the news of the day.

What are promotions?

Many retail merchants have an idea that a promotion consists simply of cutting prices for a limited time. Price cutting is probably the world's easiest promotion. It requires very little mental effort, ingenuity or resourcefulness. At the same time, it is the most expensive, destructive and unprofitable method of selling in existence.

By promotions in our business, I refer to those stimulating sales ideas that convince a hesitant public that now is the time to buy, not distress merchandise as it is being dumped, but quality goods at a fair price with satisfaction to the buyer and a fair profit to the seller.

Promotions skim the cream of the potential market, and by the cream I mean those many thousands of people, already 75% sold, on the very verge of buying, who are galvanized into buying action by a promotion—an offer presented with powerful and attractive retail advertising copy.

Promotions keep the jobbers, the dealers, sales organization, wholesale and retail, on their toes, enthusiastic, alert, and active. Promotions are the martial music, the college band to business. They overcome laziness, indifference, timidity, the danger of getting into a rut.

Activity alone, you know, is responsible for much business. Therefore, our organization in the field makes every effort to have promotions always under way to create that constant turnover which is the very life-blood of business.

A special sales meeting of sales managers and supervisors was held on February 11 with Frank H. Trembly, Jr., the Philadelphia Gas Works Company, and vice-chairman, New Business Committee, presiding. The speakers were J. L. Johnson, Sales Manager, Providence

Gas Company, Providence, R. I. on "Putting the Gas Industry on Top with the Super Gas Range," outlining the national promotion plan and the proposed local tie in; A. E. Lee, Servel, Inc., on "Special Salesmanship"; and J. Hall Truman, Jr., Commercial Manager, Penn-Western Service Corporation, New York City, on "Compensation of Salesmen."

Among the manufacturers who participated in the display of new models of various domestic appliances were American Stove Company, Cribben & Sexton Co., Estate Stove Co., Glenwood Range Co., Hurley Machine Co., Roberts & Manders Stove Co., George D. Roper Corp., and Standard Gas Equipment Corp.

Indiana Gas Association

The 1938 convention of the Indiana Gas Association will be in Gary, Indiana, Monday and Tuesday, May 16th and 17th. Headquarters will be at Hotel Gary.

Mr. Ed. Weston of Richmond is chairman of the Program Committee and A. V. Grief of Gary will be in charge of local arrangements.

Gas Industries at N. Y. World's Fair

A prospectus outlining the plans, exhibiting space, costs and facilities for exhibitors in the gas industries building, New York World's Fair 1939, has been published in pamphlet form for the guidance of manufacturers of gas appliances and accessory equipment by Gas Exhibits, Inc.

The prospectus includes a renting plan, showing in detail the exhibition spaces that will be provided in the building now under construction in the exhibit area of the Fair site. Another map shows the plan of the entire exhibit area, with the location of the Gas Industries Building clearly marked in relation to entrances, other exhibitors' buildings, government buildings and buildings to be erected by the Fair Corporation.

Ground was broken for erection of the gas industries building on January 18. The gas industry with its $750,000 structure has the distinction of being the leader in launching the vast construction program of private exhibitors at the Fair.

The gas industry's exhibit will occupy a plot of 87,042 sq. ft. in the Community Interests Zone on a wide avenue radiating from the Theme Plaza, the focal point of the main exhibit area of the exposition. The plot is S-shaped and 460 feet long. A wide circular "Court of Flame" at one end is to be the focal point of the exhibit, with four 90-foot pylons surrounding a large jet of gas to be kept burning night and day.

A model "all-gas house," where the latest and most efficient types of appliances for cooking, refrigeration, space and water heating and air-conditioning will be displayed, and an auditorium seating 350 persons will be included in the exhibit building, as well as exhibition space for manufacturers' displays. In this space, gas appliances are to be exhibited in the surroundings they would have were they in actual use.

The Fair is scheduled to open to the public on April 30, 1939, to last through November 1, 1939.

E. G. Peabody Named Manager of Utility Sales Departments

E. G. Peabody, formerly general sales manager of the Central Indiana Gas Company at Muncie, took charge of the Indianapolis Citizens Gas and Coke Utility sales departments February 1 to succeed Fred G. Rastenburg, who resigned January 1.

During the five years that Peabody directed sales for Central Indiana Gas Company, the company did one of the outstanding utility merchandising jobs in the nation. In 1937 his sales force won

E. G. PEABODY

one of the awards made in the Servel Electrolux national sales contest and his 1937 record of merchandising sales per domestic meter was one of the highest achieved by any gas company.

Peabody got his first job in the gas industry as a clerk in 1921 with the Haverhill (Mass.) Gas Light Company. He was soon transferred to the Boston office of Stone & Webster, where he worked until 1923 when he went to the Fall River Gas Works Company as home heating engineer and later became general sales manager of the company.

He was sent to Baton Rouge, La., in 1930, where he had charge of sales for the Baton Rouge Electric Company. In 1933 he became general sales manager of the Central Indiana Gas Company, which operates in Muncie, Marion, Anderson, Elwood, Hartford City, and Alexandria.

Peabody is a director of the Indiana Gas Association, a member of the American Gas Association refrigeration committee and a member of the Indiana association's commercial committee.

Louisville Ky. Celebrates a Century of Gas Service

Commemorating a century of gas service in Louisville, Ky., The Courier-Journal of that city issued on February 13th a 32 page rotogravure supplement to its Sunday edition devoted largely to the history of gas service.

Sponsored by the Louisville Gas & Electric Co., this notable supplement is a well illustrated and descriptive history of the city's growth since the formation of the original Louisville Gas Co. in 1838 with L. L. Shreve as president.

Interwoven with the story of industrial development and historical highlights the progress of gas service up to the current year is traced in an interesting way by text and many illustrations. Not the least interesting is a series of cuts showing the development of gas burners for illumination.

The closing pages show the modern gas and electric service the city now enjoys. Without doubt, as a good will builder, this excellent supplement has proven and will prove most effective. Both the utility and the publisher can be justly proud of it.

Montreal Light Heat & Power Elects W. F. Angus to Board

At the annual general meeting of shareholders of Montreal Light, Heat & Power Consolidated, held on February 16th, W. F. Angus was elected to the Board of Directors, replacing J. W. McConnell, resigned.

Mr. Angus is president of Dominion Bridge Company, president of Dominion Engineering Works, Limited, and vice-president of Canadian Car & Foundry Company, Limited. He is also a director of the following companies: Royal Bank of Canada, Montreal Trust Company, Bell Telephone Company, Northern Electric Company, Foundation Company of Canada, Canadian Locomotive Company, Eastern Canada Steel & Iron Works, Robb Engineering Works, and Dominion Hoist & Shovel Company.

Mr. Angus was born at Montreal, October 28, 1873, the son of the late Richard B. Angus, famous capitalist and one of the founders of the Canadian Pacific Railway.

HEATING BUNKER "C" OIL

for carburetting gas requires high pressure and high temperature.

ANDALE BOWED TUBE HEATERS

remain tight and are easily cleaned. These are the requirements for continuous satisfactory operation.

ANDALE COMPANY

1600 ARCH STREET
PHILADELPHIA

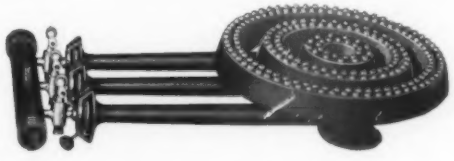
"We Use CHACE Thermostatic BIMETAL IN THE STRONG STEAM TRAPS"
THE STRONG, CARLISLE AND HAMMOND CO. CLEVELAND, OHIO.

THIS trap is recommended for removing condensation from unit heaters, jacketed cookers and similar units where very rapid elimination of air is required in starting. Chace Thermostatic Bimetal is the active element used to automatically operate the upper valve in these Strong steam traps.

If your product calls for an automatic action at a given temperature, perhaps "Chace" is your one best answer.

W. M. CHACE CO.
1610 Beard Avenue - - - Detroit Mich.

You Need The Johnson No. 40-ABC Atmospheric Ring Burner For Economical Open Flame Work



Your experience has shown you the need for a powerful, efficient burner unit adaptable to any installation where heat is required. Hundreds of satisfied users throughout the country are proof that the Johnson Triple Atmospheric Ring Burner gives you the real economy of perfect combustion and keeps costs low. Constructed of durable cast iron. Applies scientifically correct primary and secondary air supply. This concentric ring burner has such patented and exclusive features as the Johnson Direct Jet Regulator with adjustable hood cap and Johnson Venturi Mixers and Tubes. Individual control of each burner assures you the flexibility required of a unit of this type. Investigate this outstanding burner. Write for free catalog now.

JOHNSON GAS APPLIANCE CO.
Cedar Rapids IOWA

glover-west

continuous verticals

The logical plant where maximum gas yield and coke of high reactivity are required. The high thermal efficiency, low operating cost, extreme flexibility to meet variations in daily output, and freedom from naphthalene in finished gas have made this process the choice of experienced operators all over the world.

•

The proven reliability of Glover-West continuous verticals makes their adoption well worthy of consideration in any scheme of planning for the future.

•

We place at your disposal the experience gained in over 400 installations now operating in all countries of the world and under widely varying conditions, augmented by the resources of modern research and a worldwide organization.

•

WEST GAS IMPROVEMENT CO.
424 Madison Avenue New York City

Nolan Joins American-Bosch

The Water Heater Division of the United American Bosch Corporation, Springfield, Mass., announce that Mr. Ralph E. Nolan of Atlanta, Georgia, has joined this organization.

Mr. Nolan has lived in Atlanta for the past seventeen years and has made many friends among the public utility companies and appliance distributors in the South.

He will make his headquarters at 423 Citizens and Southern National Bank Bldg., Atlanta, Georgia, and will cover the states of Florida, Georgia, Tennessee, North Carolina and South Carolina.

Western Metal Exposition Exhibits

The Linde Air Products Company, in conjunction with its associates, Electro Metallurgical Company and Haynes Stellite Company, units of Union Carbide and Carbon Corporation, will exhibit at the Western Metal Exposition, to be held in the Pan-Pacific Auditorium, Los Angeles, from March 21 to 25. Latest developments in the oxy-acetylene process for the fabrication and treatment of metals will be on display.

Of particular interest to those interested in overland or industrial piping construction, will be the new Oxweld 4- and 6-Flame Lindewelding Tips which further increase the speed and efficiency of the Lindewelding technique for joining pipe.

The Air Reduction Company will also have a comprehensive display of their products.

In addition to a display of hand cutting and welding apparatus and supplies, Air Reduction will have a working exhibit of its mechanical gas cutting machines handling actual production jobs.

Further applications for welding and cutting tools will be demonstrated; such as the flame hardening of metals, the beveling and welding of pipe, the application of hard-facing alloys to worn surfaces to lengthen the service life of parts so treated, the low temperature brazing of non-ferrous metals, and other operations.

Koppers Western Gas Division Handles Michigan Valve Products

Koppers Company has acquired exclusive rights to the manufacture and sale of the line of valves and other waterworks and sewage equipment formerly produced by the Michigan Valve and Foundry Division of the Timken-Detroit Axle Company.

Production of the line will not be interrupted. It will be produced under its present trade name by Koppers Company's Western Gas Division, Fort Wayne, Ind., and will be added to its "Western" line of valves, sluice gates and similar equipment, according to R. A. Wickes, general manager of the division.

Semet-Solvay Awarded Portland (Me.) Contract for Water Gas Equipment

The Portland Gas Light Company has awarded the Semet-Solvay Engineering Corporation, of New York City, a contract for equipment that will enlarge its carbureted water gas plant.

The new construction will consist of a 10-foot reverse flow water gas machine, with backrun, and equipped for heavy oil operation. A washer cooler, multiple washer, de-emulsifier, tar separator, and considerable changes and additions to the plant piping system will be provided.

Gas Cooks for the Dogs—Does Large Volume Water Heating at Low Cost

Dog biscuits are now produced and baked on a mass scale. The company making these biscuits in Rockford, Ill. has just purchased a large tunnel type gas-fired oven with which to do part of this baking. This oven, which is 85 feet long, will be entirely automatic and carry the latest developments and improvements of this type of equipment. The unit is to augment the present gas oven which has been in operation for the last eight year, and by its addition, will about double the former production.

One of the new type of large volume automatic gas immersion water heaters, incorporating principles long used in steam coil heaters, was recently installed in a large industrial plant in Rockford, Ill. This job, with a 600 gallon tank, is supplying hot water for the men in the plant. About 2,000 gallons per day are consumed and the operating cost is as low as any job in the city, figuring approximately 85 cents per thousand gallons of water, based on an 80 degree rise and a gas cost of 65 cents per M. C. F. (565 B.t.u. gas).

INDUSTRIAL GAS BOILERS

Tubular or Flueless

¾ to 45 H.P.

P. M. LATTNER MFG. COMPANY

CEDAR RAPIDS, IOWA

Cooperative Sales Drive on Home Heating Equipment

A nationwide campaign promoting the sales of gas-operated home-heating equipment is about to be launched by the Association of Gas Appliance and Equipment Manufacturers. H. P. Mueller, president of the L. J. Mueller Furnace Company of Milwaukee, Wis., is chairman of the gas house-heating and air-conditioning division of the Association, which is sponsoring the activity.

Plans for ths extensive co-operative sales drive were approved at a meeting held at the national headquarters in New York by a promotion committee representing manufacturers of the various types of home-heating equipment.

The promotional project will take the form of a contest, officially beginning on April 1st and closing on November 30th, which will be open to two main groups: (1) Utilities, sales managers and their salesmen; (2) Jobbers and retail dealers, sheet metal contractors, and heating and plumbing contractors.

More than $20,000 will be offered in prizes to those in the utility group with cash awards for company sales managers, monthly awards for utility salesmen, and finally grand cash awards to the salesmen who maintain consistent, outstanding activity throughout the eight-months program.

A large variety of substantial merchandise awards valued at $15,000 will be presented to participants in the retail section of the contest.

In order that participants may compete on an equal basis, utility companies will be classified in divisions so that salesmen in smaller communities will have the same chance of winning as those in larger cities, and retailers will be classified geographically on a comparable scale.

The 1938 home-heating equipment sales program will be known as the "G-MAN REWARD ROUNDUP." According to the contest committee, "the project will have dramatic action and color; announcements and promotional literature will be styled on the order of confidential bulletins from headquarters, and the entire campaign will assume the character of a G-Man drive for rich rewards."

The title of the contest, which will appear on all circulated material, is unique in that the "G" will actually stand for "Gas," with the "a" and "s" in very small type.

Foxboro Appointment

Robert V. Hamilton has been appointed Resident Sales Engineer in charge of the Birmingham district by The Foxboro Company, Foxboro, Mass., makers of precision industrial instruments and controllers. He will be under the direction of W. W. Barron of the Atlanta office.

Practical industrial experience in the gas, steel, rayon and chemical industries, and sound training in the use of industrial instruments qualify Mr. Hamilton for his appointment.

TRADE CATALOGS

Published by manufacturers of Gas Equipment and Appliances for you. Order by number, using coupon on Page 62.

PLANT & DISTRI. EQUIP.

ADJUSTABLE BELL JOINT LEAK CLAMPS
Pittsburgh Equitable Meter Co. 274

ALL IRON GAS VALVES
Isbell-Porter Co. .....

ANTI-VACUUM AND BACK PRESSURE VALVES
Connelly Iron Sponge & Governor Co. 1

ARMORED GASKET
S. R. Dresser Manufacturing Co. 239

AUTO VENT BACK PRESSURE VALVES
Connelly Iron Sponge & Governor Co. 233

BACK PRESSURE VALVES
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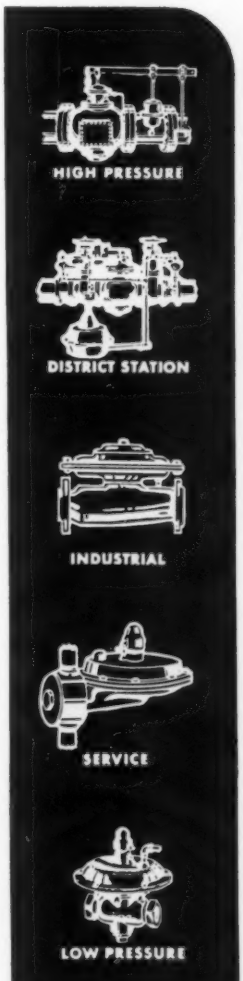

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Wm. A. Ehlers
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REYNOLDS manufactures a complete line of Gas Control Regulators. Each one in its line is designed and built to meet a specific requirement of the Gas Control field.

Correct principle, sound design and dependable performance are just three of the many reasons why Reynolds Gas Control Units enjoy preference on most specification sheets. These careful buying gas executives also know that the unquestionable after-installation performance of every Reynolds Unit is backed by nearly a half century of experience.

When your next Gas Control problem arises, call REYNOLDS—their cooperation policy is one too important to overlook.

REYNOLDS Products for all kinds of Pressure Reductions—for either Natural or Artificial Gas.

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High Pressure Line Regulators—Pilot Loaded—Pilot Controlled.

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REYNOLDS GAS REGULATOR CO.
ANDERSON, INDIANA, U. S. A.

1938 Gas Refrigerator Awards

"Stem Winder Drive" Now Under Way

Seventeen gas companies standing highest in refrigerator sales at the end of this year's gas refrigeration selling contest will each receive a Grandfather clock—the trophy chosen as the symbol for the 1938 campaign by the American Gas Association Refrigeration Committee which will conduct the campaign to last throughout April, May and June. This is the sixth consecutive year in which the Refrigeration Committee has conducted a similar drive for the sale of gas refrigerators during the Spring and Summer season. The 1938 campaign, planned on a scale larger than that of other years, will have as its watchword: "Make Every Minute Count." The chairman of this year's Committee is H. R. Sterrett, president of the New Haven Gas Light Company.

Awards other than the Grandfather clocks to be offered to winning companies include hall clocks, mantel and desk clocks, with valuable pocket watches to be won by sales employees who make the highest records. In addition to these various trophies—all symbolizing the theme of "making every minute count,"—more than 2,000 cash wards will go to both companies and sales people who come out ahead in the contest.

Anticipating the big campaign in which Grandfather clocks are to be the outstanding trophies, a "warm-up" campaign known as the "Stem-Winder drive" was started on March 1, for this month only, in which awards go only to salesmen. The April, May and June contest, known also as the "Main-Spring drive" will be followed by a final campaign during July to be called the "Golden Chimes drive," in which awards will only go to the salesmen participating.

As in the contests of the last three years, the Refrigeration Committee has developed the plans for the present campaign with a view to amply rewarding the individual sales people on whose efforts so much of the success of the contest depends.

The contest will be sponsored by Servel, Inc., manufacturer of Servel Electrolux refrigerators, through the Association of Gas Appliance and Equipment Manufacturers.

Members of the 1938 Refrigeration Committee other than Mr. Sterrett are: R. O. Berry, Jacksonville Gas Co.; B. O. Brown, Servel, Inc.; N. O. Fratt, Seattle Gas Co.; A. C. Frey, Worcester Gas Light Co.; G. T. Henry, Roanoke Gas Light Co.; H. M. Henry, Utility Management Corp.; W. A. Hudson, Houston Gas & Fuel Division of United Gas Corp.; W. L. Hutcheson, Manufacturers Light & Heat Co.; A. Jansen, Jr., sales promotion counsellor; R. A. Lawder, Consolidated Edison Company of New York; E. G. Peabody, Citizens Gas & Coke Utility, Indianapolis, Ind.; J. A. Sackett, Kings County Lighting Co.; F. C. Neuls, Industrial Division, American Gas Association, and F. E. Sellman, Association of Gas Appliance and Equipment Manufacturers.

Gas Industry Aids Housing Program

At a meeting of important executives of the gas industry on February 7th final plans for the industry's nationwide home building program were approved. It is recognized by the gas industry that a revival of building activity over the next several years will result in the construction and modernization of millions of homes and that these homes should be equipped with the latest and best in automatic gas cooking and refrigeration equipment, automatic gas water heating, automatic gas house heating, air conditioning, incineration and gas laundry appliances.

Included in the program will be an architectural competition among the architects of the United States and Canada for the design of all-gas homes, a builders' competition for the construction of these homes and the contemplated reproduction of several of the prize winning homes at the New York World's Fair. The sum of $23,700 has been appropriated as prize money for the architects' and builders' competitions.

Part of this wide gas industry's program will be to demonstrate up-to-date equipped homes to millions of Americans.

In cooperation with local architects and builders, model homes will be constructed fully equipped with gas appliances so that millions of people may see in actual operation the latest and best which the gas equipment industry produces and to be informed of the economical services which are available through the great gas utility companies. It is thought that by such display, the public may readily become fully informed regarding the important developments which have been made toward comfort, livability, health, economy and convenience which gas appliances provide.

Under the direction of Major Alexander Forward, Managing Director of the American Gas Association, Mr. J. F. Quinlan is directing this nationwide gas industry program and the new Home Appliance Planning Bureau at Association Headquarters. The theme of the program "Use Gas for All 4" is being incorporated into all national advertising. Local companies will be asked to support the program by local newspaper advertising and other local promotional activities.

Gas Service Men's School

The second session of the service men's school sponsored jointly by the Derby Gas and Electric Company and various appliance and equipment manufacturers was attended by 86 men. The session was held on February 16th in the auditorium of the Derby Gas and Electric Company, Derby, Connecticut. The day was devoted to the discussion of ranges, radiant fires and unit heaters. Mr. Charles E. Merriam of the Glenwood Range Company, Taunton, Mass., was the first speaker and described the construction, operation and adjustment of the Glenwood Ranges. This included demonstrations of low settings possible with the "Dual Thrift" top burner and the new kitchen heating unit which is an important part of the Glenwood line. Numerous questions were asked concerning the operation of the range and its safety features and also desirability of gas pressure regulators on ranges.

After lunch Mr. Norman Griffith of the Estate Stove Company reiterated Mr. Merriam's remarks about the necessity for proper adjustments of top and oven burners and pointed out some of the features of the indirect type of oven. He was followed by Mr. Sullivan, Eastern Service Manager of the Estate Stove Company who demonstrated the methods of making all necessary adjustments on the range and also the way in which ranges should be leveled in order to obtain the proper baking results.

At the conclusion of Mr. Sullivan's discussion Mr. William Hanson, Service Manager of the Providence Gas Company summarized the previous talks and the various questions which had been asked by members of the school. Mr. Hanson particularly emphasized the need for proper burner input and the necessity for accurate and careful pressure regulation. He discussed at great length the problems peculiar to gas ranges and gave suggestions based on his experience in various capacities in the service departments to insure better and most complete satisfaction to the user.

Following Mr. Hanson's summary of the previous discussion on ranges Mr. Julius Meier, General Gas Light Company, New York City discussed the installation and servicing problems of radiant fires and Humphrey Unit Heaters. The knowledge which he had gained from his work in the design, testing and application of unit heaters was very effective with the men of the school and as usual they participated by questions covering their own field experience.

W. W. Caldwell in New Post

W. W. Caldwell has resigned from the J. G. White Engineering Corporation to become Vice-President and General Manager of the building construction firm of Iglehart, Caldwell & Scott, Inc., of 80 Broad Street, New York City.

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"Satisfaction Guaranteed"

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Mid-Western Utility

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with

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Conversion Water Heaters

AUTOGAS CORPORATION

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General Sales Agent

Republic Heaters Sales Co., **Chicago**

GAS SERVICE STOPS

SINCE 1869 Hays has built dependable brass products for the Gas Industry. Standard, Special Weight, Heavy Pattern and High Pressure Stops to meet all requirements are manufactured by Hays in a full range of sizes. Write for Catalog No. 4 today.

HAYS MANUFACTURING CO. ERIE, PA.

IRON SPONGE "Stands Up"

Striking comparison between ordinary wood shavings (left) and Connelly selected wood filler (right), as used in IRON SPONGE — the ideal gas purification material. Note how Connelly selected wood filler resists compression or "packing down." Write for Bulletin No. 100-B-1.

Connelly Iron Sponge & Governor Co.

Chicago, Ill. **Elizabeth, N. J.**

Gas Firing with Insulating Refractory Linings Makes Low Cost Steam

1.—Laying up lining of Insulating Fire Brick.

2.—Boiler Front Showing Burner Arrangement.

3.—Shows Condition of Lining after 12 Months Service. No Repairs Required.

Photos Courtesy Quigley Company, New York

Conversion from coal to gas fired operation of an H.R.T. boiler with a builder's rating of 125 h.p. is shown in part by the accompanying illustrations.

Here considerable economies were effected by lining the entire combustion space with a 4½" veneer of insulating refractory brick tied into the previous fire brick lining.

The conversion from coal to gas operation was carefully engineered by the Gas Company with full consideration of all factors before the change was made.

Burners are of the modified venturi type inserted in the ash pit openings as shown. They are the No. 102 of National Gas Equipment Co., operated at 3 to 5 lbs. pressure, equipped with L.P. Stoker Precision Draft Control.

The advantages of the installation have been summarized as follows:

(1) Savings in direct fuel cost between 8 and 10%. (2) Quick pick-up. (3) Rapid response to load changes. (4) Reduced radiation losses. (5) More uniform heating. (6) Greater transfer of radiant heat to the boiler. (7) Steam pressure higher after overnight shut-down. (8) Boiler on the line much earlier in the morning.

The installation is simple, low in maintenance, high in efficiency, and is producing low cost steam.

Indiana Gas Association Technical Committee Meets

The first meeting of the Technical Committee of the Indiana Gas Association, was held at Purdue University on February 7th. The purpose of the meeting was to exchange information and to lay out a program of work from the technical side of the gas distribution and utilization.

Those in attendance included key men from the distribution and utilization departments of the Indiana Gas Utilities. The general session was followed by separate meetings of groups to discuss unaccounted for gas, use of standby plants for peak shaving and problems in gas appliance installation and servicing. Several topics for research at the Gas Engineering Laboratories at Purdue Unviersity were suggested and an outline of work now under way was presented by Mr. J. M. Krappe, Associate in Gas Engineering, Engineering Experiment Station.

The officers of the Technical Committee are: Chairman, Herman Horstman, Indianapolis; Vice-chairman, D. B. Blake, Jr., Gary, and Phil Rector, Muncie, Indiana.

Servel Directors Reelected

At the Annual Meeting of Stockholders of Servel, Inc. held at Dover, Delaware, February 24, 1938, the following directors were re-elected: Murray H. Coggeshall, Elon V. Ekman, Samuel M. Greer, William V. Griffin, Charles G. Groff, Richard C. Hunt, Hunter S. Marston, Louis Ruthenburg, Axel L. Wenner-Gren.

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BOSTON MASSACHUSETTS

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MUCH LESS OXIDE

TO REMOVE MORE SULPHUR!

The savings LAVINO "ACTIVATED" OXIDE can make for you are easy to understand: Greater capacity and activity permit far greater H_2S removal per pound of oxide. It's a proven fact.

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Repairs
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METER REPAIR PARTS
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LAMBERT METER CO.
BUSH TERM. BLDG. 4, BROOKLYN, N. Y.

Installment Selling

(Continued from page 35)

That implies that consumers on the whole have a pretty clear conception of when to go into debt and when to get out and stay out of debt. It implies also that credit men know what they are doing. And, on that basis, there doesn't seem any reason to cry from the housetops that instalment selling dooms the country to perdition. Rather, the logical conclusion would seem to be that instalment credit has become part and parcel of our national economy, has found its place, and will stay in its place. And so long as you, as gas men, try to limit your sales of gas to appliances that are likely to stay put in the home—in other words on appliances that are soundly sold only to householders who are good credit risks—you don't have to worry too much about talk that instalment is the black beast of modern civilization. It comes down to this. You can't buy prosperity on the instalment plan; and you can't create a depression on the instalment plan. Instalment credit is only one of the cogs in the turning wheel of business. It isn't the turning wheel itself. And that's what so many prophets of doom forget.

Repossesses Appliances

(Continued from page 23)

like, were paid for, there would be imposed upon him an arduous, if not an impossible, task. . . . In making sales upon the partial payment plan, it is just as easy to take a mortgage and have it recorded, and little additional expense is incurred thereby."

Therefore, it is quite apparent that a seller of gas appliances should record the contract of sale or a mortgage, otherwise a purchaser of property, or the lender of money on the property, or one who takes a mechanic's lien, may retain the equipment without liability.

Another important and well established point of the law is that although a chattel mortgage or contract of sale is properly recorded, but the appliances are attached to the building in a manner that the building will be permanently marred or damaged, by removal of the appliances, then the appliances become legal fixtures and a part of the realty and cannot under any circumstances be removed.

Book Review

"Commercial Kitchen Manual" prepared and published by American Gas Association. 211 pages. Price $1.00 per copy.

This new manual should be in the hands of all who have to do with the planning of commercial gas kitchens or the installing or servicing of gas kitchen appliances.

There are four parts. The first deals with the types and sizes of gas appliances, covering some 39 classes of gas kitchen equipment. The second part deals with general information regarding installation practices for the equipment already described. The third part, devoted to servicing, explains the general principles of servicing the various gas burners, controls, regulators, etc. The final part of the book is devoted to specific instructions covering individual manufacturer's products. This section is preceded by a list of commercial kitchen gas appliance manufacturers, their addresses, trade names, and the products they make, regardless of whether or not their equipment has been described in detail in the pages which follow. This directory includes 86 manufacturers.

Much of the information, such as proper ratings of gas appliances and the correct adjustment of thermostatic controls, has been assembled and made available for the first time.

The directory of commercial appliance manufacturers is particularly welcome, and the descriptions include many specialized units which will be found useful in developing the commercial cooking load.

McLenegan Will Manage G.E. Air Conditioning Institute

D. W. McLenegan, assistant commercial engineer of the General Electric air conditioning department, has been named manager of the General Electric Air Conditioning Institute by J. J. Donovan, department manager. R. D. Wood will assist Mr. McLenegan with the institute activities.

The institute has been in existence for three years, during which time it has been the focal point for various independent studies related to heating and air conditioning and the medium through which training activities have been carried on. Coincident with the new appointments, Mr. Donovan announced that these activities will be considerably enlarged beginning immediately, with special emphasis on educational phases of its program, in an attempt to meet the demand for better-trained men in all phases of the air-conditioning industry.

The institute will henceforth have a home of its own as appropriate quarters have been constructed on the roof of the present main building of General Electric's air conditioning plant at Bloomfield, N. J. An auditorium, offices, and an exhibit room are included, and a complete line of heating and air conditioning equipment will be on display.

Penn Opens Office in Philadelphia

Penn Electric Switch Co., Goshen, Indiana, has announced the opening of a branch office at 4503 North Broad Street, Philadelphia. All sales and service activities in the Philadelphia territory will be handled from the new branch, R. H. Luscombe, Penn sales manager, said in making the announcement.

D. A. Coon, formerly sales engineer on the company's New York branch staff, has been placed in charge of the New Philadelphia branch. In addition to his work with Penn on control engineering, Mr. Coon has had much experience in the sales and application of general heating accessories.

The Companion of Success

SOME ANONYMOUS GENIUS once said: *"Confidence is the companion of success"*. For nineteen years GPM has specialized in nothing but oxide and confidence. And now we report: out of three million bushels of oxide sold within the past two years, two million bushels were repeat orders.

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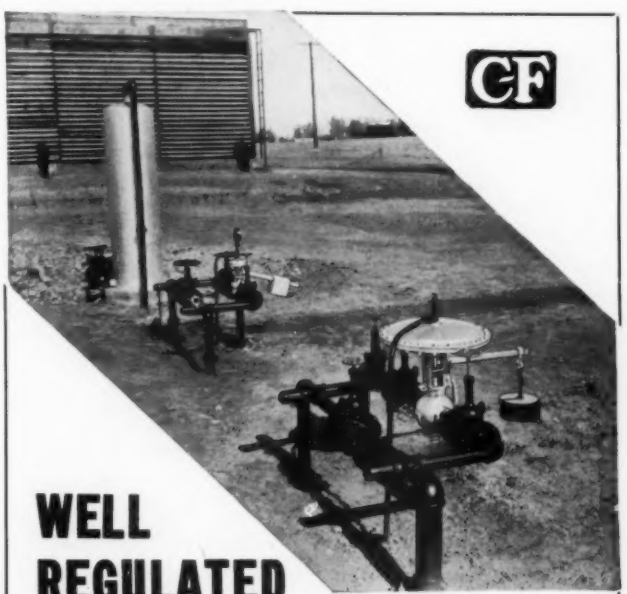

WELL REGULATED

Here a Chaplin-Fulton High-Pressure Regulator and a C-F Low-Pressure Regulator with automatic cut-off are seen on the fuel line of a 400-h.p. gas engine used by a leading oil company in Kansas.
Chaplin-Fulton pressure-control devices for all uses have been standard equipment in the oil and gas industry for over fifty years. Ask for catalog.

THE CHAPLIN-FULTON MFG. CO.
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Home Service as a Load Builder

A round-table discussion of ways in which home service can aid in increasing the gas load, led by Jane Tiffany Wagner, home service director of Servel, Inc., was a high light of the all-day conference of the New Jersey Gas Association Home Service Committee in Asbury Park, N. J., on February 14. Home calls, lecture-demonstrations and complaint calls were discussed as to their sales value, the consensus being that each type of service could lead to more sales.

This was the first state-wide conference of gas utility home service directors to be held in any state, according to Mrs. Eliza Stephenson, of the Jersey Central Power and Light Company, chairman of the committee. Nearly forty home service consultants attended, as well as approximately twenty representatives of gas equipment manufacturers.

Those on the Committee headed by Mrs. Stephenson are: Anita Meiser, of the Peoples Gas Company; Della M. Cordery, Florence Wren, Helen Farrell and Loretta Brady, all of the Public Service Electric and Gas Company; Lois Holt, of the Elizabethtown Consolidated Gas Company; Jane Tiffany Wagner, of Servel, Inc., and Jane L. Roberts, of the Roberts and Mander Stove Company, Philadelphia.

Alfred D. Howard, sales promotion representative of Servel, Inc., spoke during the afternoon, tracing the history of refrigeration from early Roman times to the present, showing how the Servel Electrolux refrigerator with its natural method of freezing is superior to any other type.

B. A. Seiple, vice-president of the Jersey Central Power and Light Company, gave an address of welcome. Mrs. John Hulsart, of Manasquan, N. J., told what the home service department meant to her town.

Jessie McQueen, home service counsellor, American Gas Association, appeared on the program which also included Preston D. Gardner, division commercial manager, Public Service Electric and Gas Company of New Jersey.

CONVENTION CALENDAR

March

21-22 Liquefied Petroleum Gas Association, St. Louis, Mo.

April

4-6 *American Gas Association,* Distribution Conference, Netherland Plaza, Cincinnati, Ohio.

11-13 *Mid-West Gas Association,* St. Paul, Minn.

18-21 *American Chemical Society* —Division of Gas & Fuel Chemistry, Dallas, Texas.

20-22 *Missouri Association of Public Utilities,* St. Louis, Mo., Jefferson **Hotel.**

May

3-5 *Pennsylvania Gas Association,* Annual Convention, Sky Top, Pa.

9-12 *A.G.A. Natural Gas Department,* Roosevelt Hotel, New Orleans, La.

14-21 *International Petroleum Exposition,* Tulsa, Okla.

16-17 *Indiana Gas Association,* Annual Convention, Hotel Gary, Gary, Ind.

23-24 *A.G.A. Commercial and Hotel & Restaurant Sales Conference,* New York, N. Y.

24-26 *A.G.A. Production & Chemical Conference,* Hotel Pennsylvania, New York.

25-28 *A.G.A.E.M.* Annual Convention, White Sulphur Springs, W. Virginia.

June

9-10 *Canadian Gas Association,* Annual Convention, Royal York Hotel, Toronto. (No exhibits.) G. W. Allen, Secretary - Treasurer, Astley Avenue, Toronto, 5.

23-24 *New England Gas Association,* Sales Conference, Viking Hotel, Newport, R. I.

October

10-14 *American Gas Association,* Annual Convention, Atlantic City. (No exhibits.)

Maryland Utilities Assn.

The annual meeting of the Maryland Utilities Assn. will be held at the Lord Baltimore Hotel, Baltimore, Md., April 29th. Individual meetings of the gas, electric and transportation groups will be held in the morning. A general session will be held in the afternoon to be attended by all groups. Selected speakers will address the meeting.

Missouri Association of Public Utilities

The annual State convention of the Missouri Association of Public Utilities will be held this year on April 20, 21 and 22 in St. Louis, Mo., at Hotel Jefferson.

Among the subjects to be discussed will be: "Employee Spirit—the Pulse of Business," "Fundamental Research and Industrial Progress," "Water Softening," "Looking Forward in the Gas Industry," "National Legislation Affecting Industry," "What the Manufacturer Is Doing for Economical Utility Operations," "Yesterday, Today, and Tomorrow," "The Light Ahead," "Some Observations."

A get-together luncheon will be held at noon, April 21, and the annual dinner and entertainment will be in the evening, April 22. Chester C. Smith, president of the Association, will preside at the business sessions and at the luncheon and banquet.

Parsons Elected to New Post

Lewis M. Parsons has been elected Vice-President in charges of Sales and a Director of the Jones & Laughlin Steel Corporation, Pittsburgh.

After leaving University of Pennsylvania in 1917 where he was on the varsity crew and the freshman fotoball and swimming teams, class of 1919, to join the Navy during the World War in the destroyer service and later in the Naval Flying Corps, young Parsons entered the employ of the Bethlehem Steel Company in the sales division. He was made assistant manager of sales, Philadelphia office, in 1932, and manager of sales at the same office in 1936.

With Jones & Laughlin, effective March 1st, he will have entire charge of all sales activities, including district sales offices.

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Equipped with Improved Patented Locking Sleeve, which locks both handles to the pipe. Stopper cannot slip. Gas cannot pass.

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(Continued from page 20)

of the coating. The ductility is sufficient to provide for the normal swaying and bending of pipe during loading, transportation and installation.

Application

Application requires the use of equipment only available at mills. The equipment cost would hardly be justifiable at any application location considered temporary or subject to use only a small proportion of the time. It therefore appears that users of vitreous enamel must have it applied by specialists.

The field joint is as in many other instances the weak point. Securing of temperatures sufficient to fuse the materials is impractical. Other types of coatings are therefore frequently resorted to. Unless the field joint can produce a period of protection equivalent to the remainder of the coating there arises a question as to justification of the cost of vitreous enamels. The producers of vitreous enamels are confronted with an inertia in the adoption of this excellent material by sub-surface line operators due primarily to the difficulties of securing a satisfactory field joint and secondarily to cost.

The same difficulties pertain to repair of damaged areas as to field joints.

Experience

A rigid type of vitreous enamel failed in California after three years of service. Developments in the art have occurred since.

SYNTHETIC RESINS

Discussion of pipe coatings and wrappers would not be complete without mention of some of the materials as yet unproven but possessing possibilities. The synthetic resins or bakelites may be placed in the category of possibilities. There has been exceptionally rapid development in the synthetic resin industry during the past ten years. New properties of the many forms are being discovered, many of which are necessary in sub-surface protection.

Classification of Synthetic Resins

"Synthetic resins may be roughly classified according to their general methods of manufacture, and from this standpoint two types may be distinguished, namely, condensation and polymerization resins. Condensation resins are formed from the interaction of two or more different compounds yielding essentially new molecules, while polymerization resins result from the reaction of the molecules of one compound with each other. In many instances, both types of reactions are involved, as with phenol - formaldehyde, urea - formaldehyde and glycerol-phthalic anhydride resins.

Plastic materials may be further subdivided into two broad types designated, respectively, thermosetting and thermoplastic. As examples of the former, the phenol-formaldehyde and the urea-formaldehyde resins may be cited. The chemical reaction involved in their preparation is not completed in the production of the molding powders. In this form they are thermoplastic and may, by the application of heat and pressure, be readily pressed in a mold to the desired shape. When the heated mold attains the proper temperature, the chemical reaction is completed and an infusible product is obtained.

The thermoplastic resins—viz., cellulose nitrate, cellulose acetate, and shellac—may be formed and re-formed many times into definite shapes by the application of the heat and pressure, provided sufficient plasticizing agent is present to impart the proper flow. No chemical reaction takes place during heating; hence the material remains in the plastic state as thermoplastic resins are heated to the softening point, pressure is applied, the mold cooled and the casting removed."

"The resinous masses vary in properties through a wide range from rubbery materials to hard, brittle resins, depending upon which variety of vinyl compounds is used as the raw materials."

(Above quotation from "Vinylite Resins"—Carbide and Carbon Chemicals Corporation.)

Pipe Protection Properties

A proper bond of certain types of synthetic resins to metals is only secured when the resins are baked at relatively high temperatures. Development may eliminate this feature as the bond necessary for sub-surface coatings is not as great as for implements frequently handled.

Some valuable properties possessed by certain resins are low moisture absorption, chemical inertness, resistance to most reagents, tendency to cold flow is slight and excellent dielectric properties. The strength is not affected by aging. The resins in the plastic state readily lend themselves to extruding, blowing and spinning which are important for application.

Some of the resins lend themselves to impregnation suggesting their use in wrappers. It may be possible to secure a greater tensile strength and flexibility in the wrapper and decrease water absorption by the use of some form of resin.

(To be continued in April issue)

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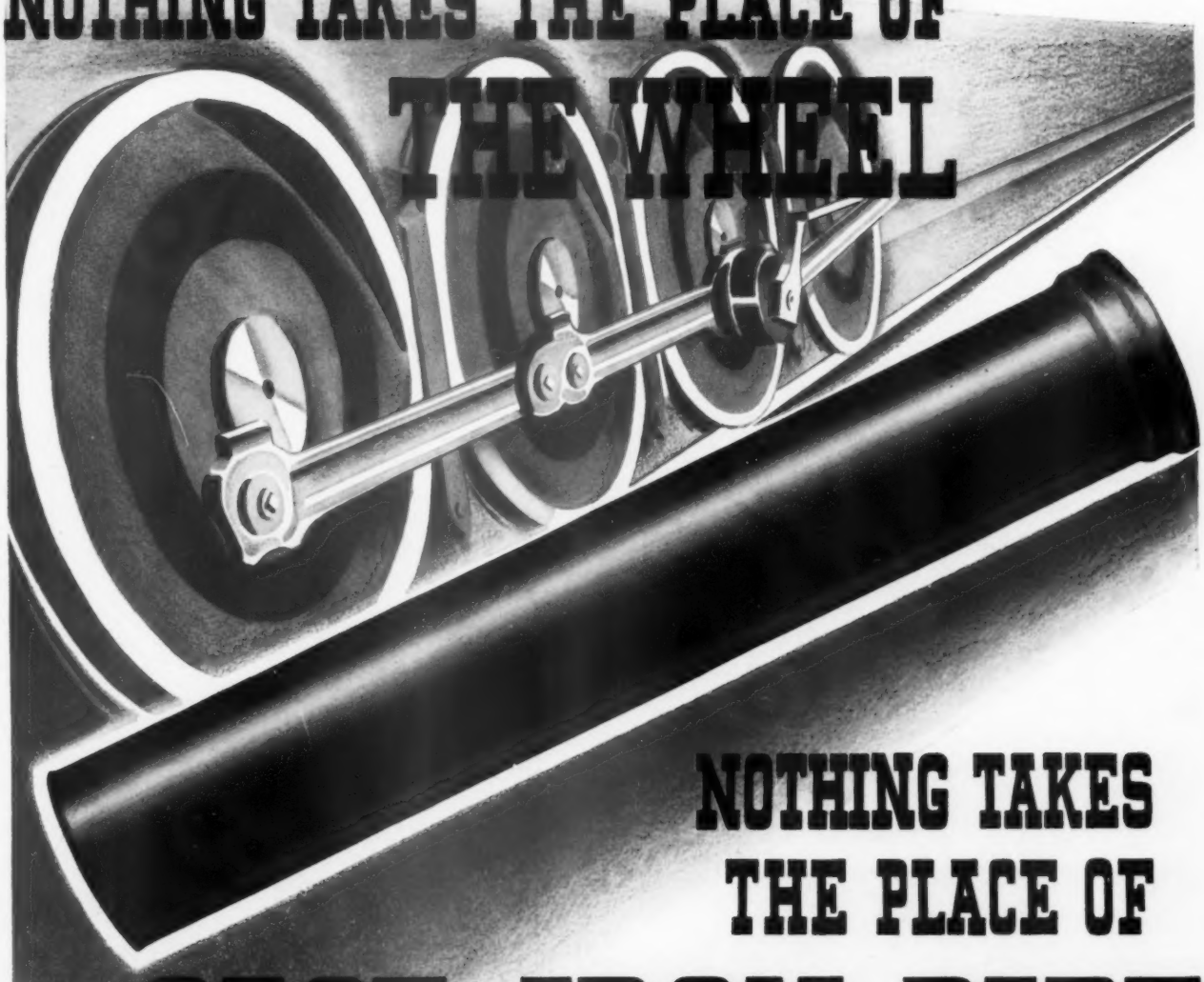

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If you demand *proved* long life and low maintenance cost that result from effective resistance to corrosion—assured safety margins for impact, beam load and crushing stresses—and permanently tight joints—then you will agree that *nothing takes the place of cast iron pipe.* Some materials meet some of these requirements but only cast iron pipe meets them all.

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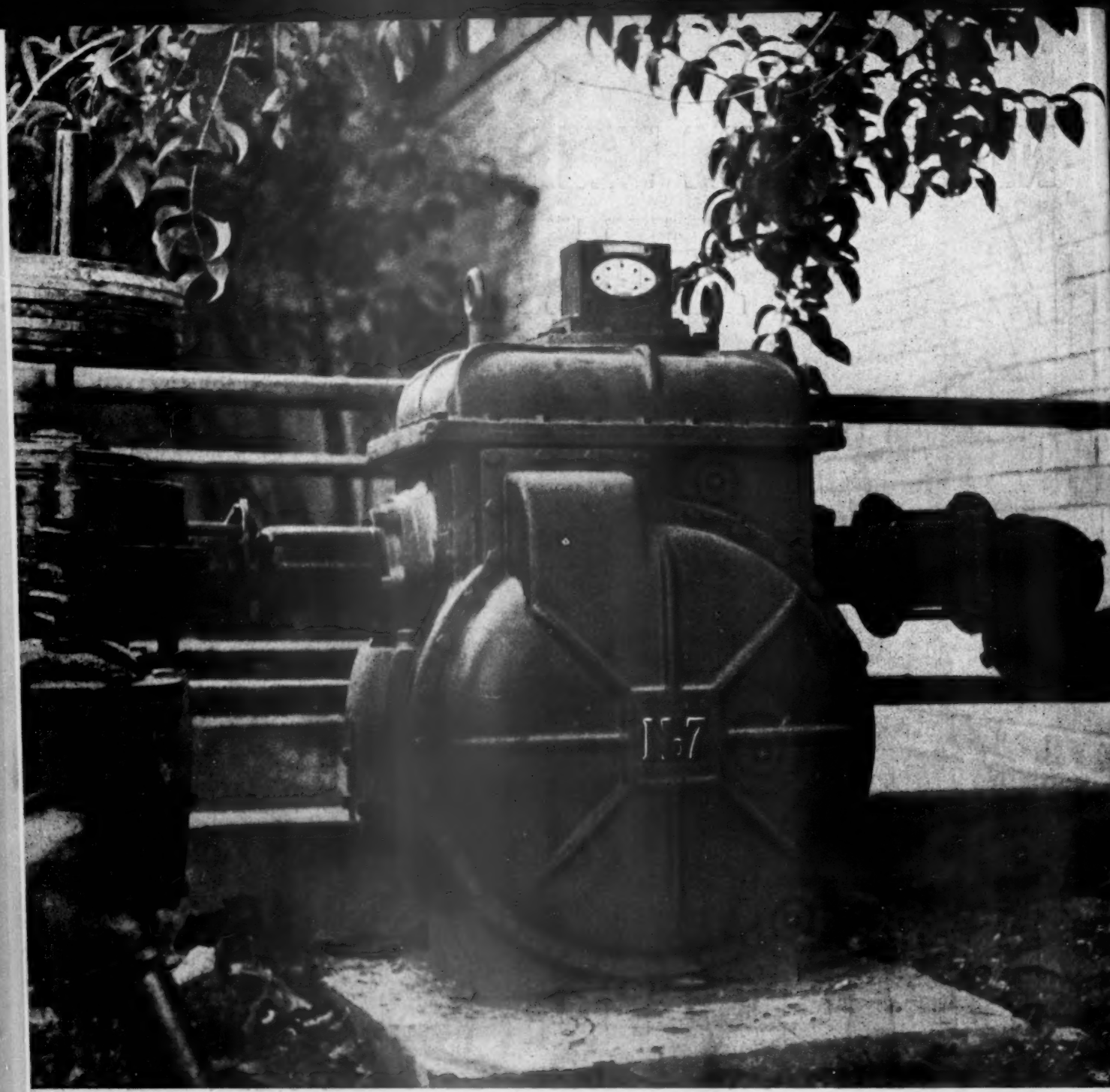

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WRITE FOR BULLETINS No. 16A & No. 19

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